

Annual Show Issue and Specification Number

MOTOR AGE

Vol. XLIII
Number 4

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CHICAGO, JANUARY 25, 1923

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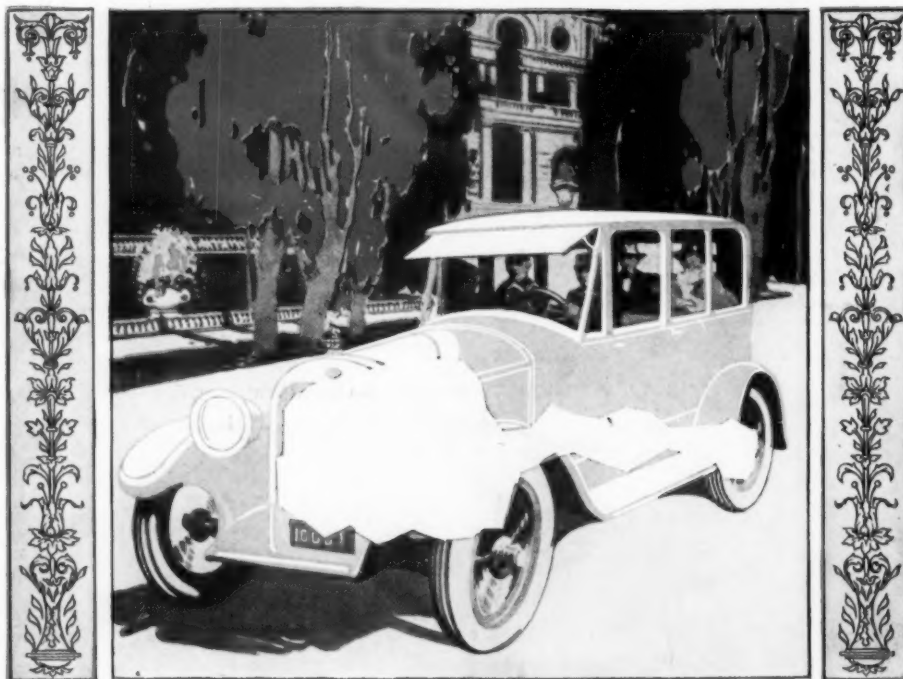
First Showing **HAYNES**

57 and 77 Sport and Standard Models

Fourteen distinct types appear on two wheel base lengths. See these cars at the Chicago National Automobile Show at the Coliseum, January 27 to February 3

OUR NEW SALES PROGRAM IS THE BEST MONEY
MAKING PROPOSITION EVER OFFERED AUTOMOBILE
MERCHANTISERS. WRITE OR WIRE US FOR DETAILS.
SHOW HEADQUARTERS—CONGRESS HOTEL, CHICAGO

THE HAYNES AUTOMOBILE COMPANY, Kokomo, Indiana
EXPORT OFFICE: 1715 BROADWAY, NEW YORK CITY, U. S. A.



Sell Specialized Vehicles



The startling increase in the demand for SPECIALIZED cars and trucks is easily accounted for. The public knows that the SPECIALIZED Vehicle is built of **known** performing units—units known for their records of performance; units known by their familiar trade-marks.

It is to the advantage of service stations to further the sale of Specialized Vehicles. There is satisfaction in serving them. Replacement parts are obtainable at all times, speedily and economically, from the many parts-distributing stations throughout the world.

Sell and service SPECIALIZED cars and trucks—the vehicles whose units are recognized by well-known marks of specialization—the motor by the Continental Red Seal.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, U. S. A. Factories: Detroit and Muskegon
LARGEST MOTOR SPECIALISTS IN THE WORLD

Continental Motors

the power units of



SPECIALIZED Vehicles



The 1923 Silvertown

The Goodrich Silvertown Cord improves with age and experience. Each succeeding year sees a better Silvertown. New refinements, new strength, new flexibility, new riding ease enter the Silvertown every year and in time give way to newer qualities and newer improvements. Thus the Silvertown yields deeper and more gratifying results to the motorist with every new set. In this manner the tremendous Silvertown following is held unwaveringly to Silvertowns. Our 1923 Silvertown is our greatest Silvertown—a better tire than the motoring world has ever known. Make it your leader for the approaching season!

THE B. F. GOODRICH RUBBER CO.

Akron, Ohio

ESTABLISHED 1870

Goodrich

Silvertown CORD TIRE

"BEST IN THE LONG RUN"

The Trainor Policy

Page 2

We shall place on the market only such quality of goods as will in themselves merit the confidence and the approval of the trade.

Trainor springs will be backed by a guarantee of satisfac-

— from the Trainor code of Marketing and Manufacturing Practices.

SUCH is the ideal back of Trainor Springs. And back of this determination are the experience and equipment necessary to insure *better* springs.

Many leading jobbers and dealers know that Trainor does build better springs, and furthermore, they know the business-building power of the Trainor Guarantee.

Trainor Springs are guaranteed to satisfy the user in every respect. You are the judge.

A thoroughly high-grade, oil-tempered, heat-treated spring, manufactured in one of the most modern spring plants in the country and backed by an unqualified, unrestricted guarantee! Is it any wonder that Trainor Springs are daily becoming more popular with jobbers and garagemen?

Jobbers: Write today for our proposition. Dealers: Write for the name of the nearest Trainor jobber.

NATIONAL SPRING COMPANYNEW CASTLE, IND.



TRAINOR
SPRINGS

MOTOR AGE

Published Every Thursday by
THE CLASS JOURNAL COMPANY
 MALLERS BUILDING
 59 East Madison Street,
 CHICAGO, ILLINOIS, U. S. A.

Vol. XLIII Chicago, January 25, 1923 No. 4

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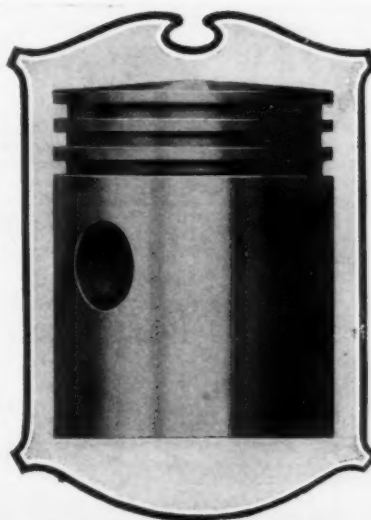
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Entered as Second Class Matter Sep^r 19, 1899, at the Post Office at Chicago, Ill., under Act of March 6, 1879.



The Heart of the Motor

Must beat with rhythm, without undue friction, with lightness and power.

The power transmitted to the wheels is all that is available for driving the car. All other power produced is used to overcome friction and excessive weight in the reciprocating parts.

Pistons are the heart of the power plant and to be efficient must be light in weight, close fitting, frictionless to the minimum degree, strong, long wearing, run cool, hold compression and get maximum results from the oil and fuel used.

The E. C. L. Non-X Aluminum Alloy Type of Pistons meet all of these exacting requirements to a greater degree than any piston known today. They give more value for the dollar expended. This statement is backed up by the fact that they are now used in many of the foremost makes of cars as standard equipment.

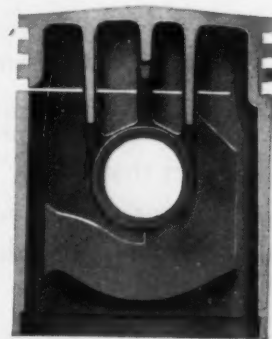
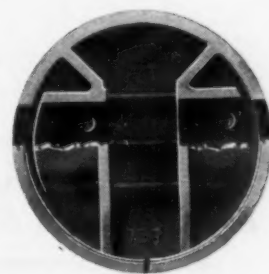
The dealer or repair man who furnished his customers these E. C. L. Non-X Pistons for their motors is giving them the best service the market affords.

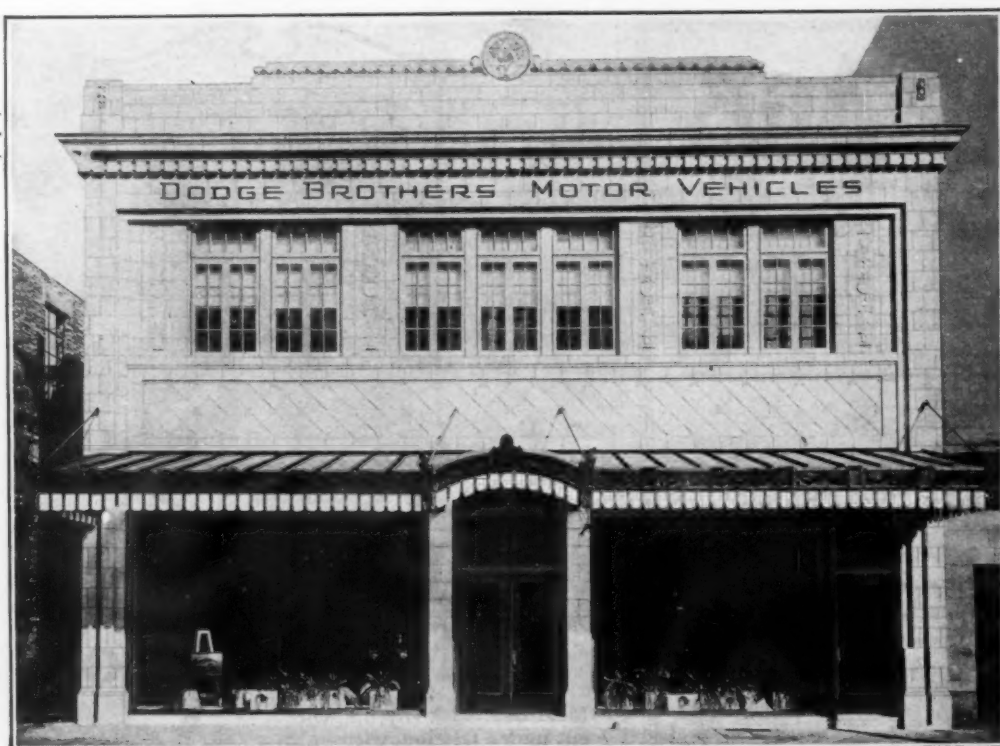
A few more territories open to Distributors and Dealers. Wire or write for particulars. See our exhibits at Chicago Auto Show, Space 34, and Kansas City A-43.

E. C. LONG

Main Office and Factory:
 4834 Beaubien Street, Detroit, Mich.

E-C-L Pistons
 ALUMINUM ALLOY, NON EXPANDING





DODGE BROTHERS
SALESROOM

NEWARK, N. J.

Cream glazed Terra Cotta.
Background of second story
decorative panels in Della
Robbia blue.

WM. E. LEHMAN, Architect

Making the MOST of COLOR

HERE'S an automobile salesroom of distinctive architecture and color-treatment. It isn't faced with a drab, sombre-looking material as so many salesrooms and garages are. Instead, it is faced with Terra Cotta in an immaculate, lustrous white, touched here and there with delicate light blue. It is a *building different*—unusual—attention-compelling—easily identified. It's a very good advertisement for Dodge Brothers.

Owners of automotive buildings often overlook the fact that beauty of color adds quite as much to a front as does beauty of form. The architect of the above building used color cleverly and effectively, not only to bring out the beauty of the decorative panels between the upper windows, but to advertise Dodge Brothers directly. Their emblem on the parapet of the building is executed

entirely in colored Terra Cotta.

A Terra Cotta front can always be kept as spotless, fresh, and new-looking as the day it was built. Terra Cotta has an advantage over other facing materials in that it can be cleaned by a simple washing with soap and water. It never needs expensive sand-blasting. Economical in first cost and maintenance, unlimited in variation of form and color, waterproof, weatherproof, dirt-proof, and fire-resistant, Terra Cotta is the ideal facing material for automotive buildings of every kind.

Let us help you with your building. We believe we can give you information that may save you time and money. And we are cheerfully at your service. Address **National Terra Cotta Society**, 19 West 44th Street, New York, N. Y.

TERRA COTTA

Permanent

Beautiful

Profitable



The Publisher's Service Station

Rendering Service to Help You Render Service



What Will Be Next?

Of all the industries in the United States, that in which we are engaged is probably the most progressive and energetic. It is continually offering to other industries something new in design, equipment, service, sales methods, personnel or organization.

While the automotive industry is now basically well established, it is still growing and developing and undergoing changes at an amazing rate. A short mental survey of the history of the industry during the past year will convince you that this is true. For instance, in recent numbers of MOTOR AGE, we have printed interesting stories on these changes, such as

A new 6-cylinder car at \$795.

A new copper-cooled car at \$725.

Two new cars in the \$2500 class.

Small car of a well-known make at \$575.

Production of 2,576,000 motor vehicles in 1922.

New car to be made in Virginia.

New 6-cylinder models in a number of lines.

Mileage guarantee extended by one company.

New dealer contract gives sliding discount and share of profits.

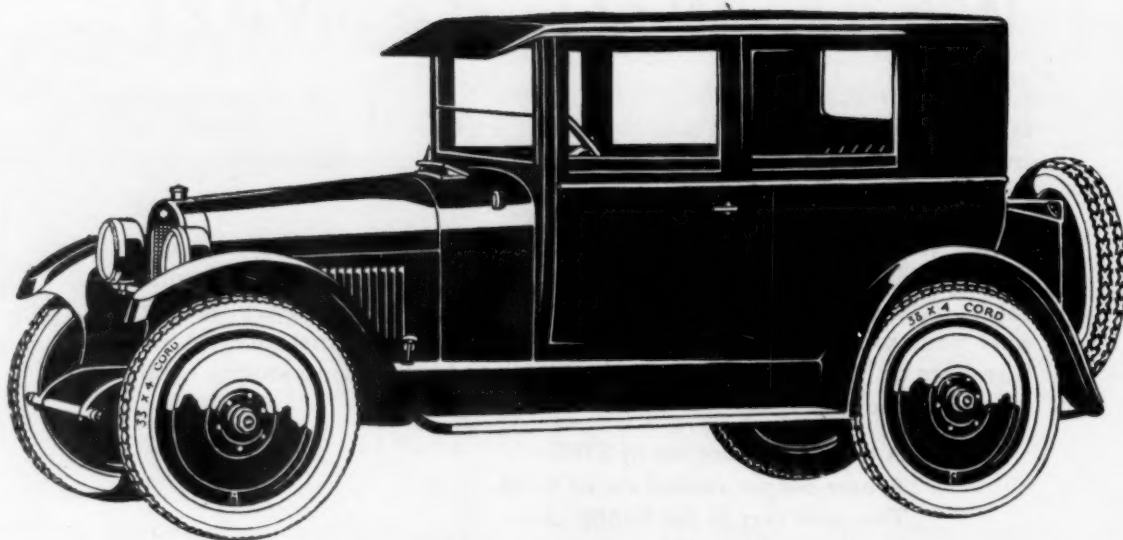
Yet these are only a few of the important news developments recorded in the last few months. Many of these fundamental facts to which all readers will find occasion to refer throughout the year are given in this **Annual Show Issue and Specification Number**.

But the new facts that make up the current history of the automotive industry and that form the week-to-week news, can be printed only as they occur. The value of these news stories in MOTOR AGE depends upon their being published as they happen and while they are still news. Needless to say, they cannot be planned in advance—it is impossible to forecast what will happen next.

But we can promise you that if the wires hum on Monday with a startling announcement concerning the automotive world, you will read about it in that week's number of MOTOR AGE.

To get it, and get it all, you should read every number of your business paper—MOTOR AGE.

NASH



Price \$1275, f. o. b. factory—*Five Disc Wheels and Nash Self-Mounting Carrier, \$25 Additional*

The New Nash Carriole

The New Nash Carriole provides fresh proof of Nash enterprise and progressiveness.

From the viewpoint of the Nash dealer, it means a wider market, increased business, and greater profits.

So that now the Nash franchise is even more intensely desirable than ever before.

A few available territories are ready to be closed. Write at once.

Features and Appointments of the Carriole—All-metal body. Two restful parlor car chairs in front. All windows except rear are adjustable. Silken curtains. Capacious pockets in doors. Dome light. Commodious, strongly built, patent leather finish trunk mounted upon trunk rack at rear. Heavy nickel-plated guard bars at back of body. Enhanced smoothness and power responsiveness. Greater mileage per gallon of fuel. Barrel-type cowl and head lamps. Cowl ventilator. Transmission lock.

Nash Motors Company, Kenosha, Wis.

If you were a Marmon Dealer—

—the nationwide interest in Marmon's proved dependability would quickly be reflected in your sales, and in your profits—

In your sales because \$4.71 per month per car for maintenance is a revelation to motorists who have learned to asso-

ciate fine cars with high up-keep. In your profits, because low maintenance means that only a small part of your revenue would be turned back into service.

You would have the unstinted help of the Marmon Sales Extension Division to make your Marmon franchise yield its fullest return.

"How to Shop at The Show" is an instructive booklet that explains many Marmon merchandising features in detail. A sales guide that every dealer should have. A copy will be mailed free on request.

Write for it today.



NORDYKE & MARMON COMPANY

Established 1851

INDIANAPOLIS

Address Inquiries to Dept. A

MARMON

The Foremost Fine Car

This is the twenty-ninth of a series of fifty-two advertisements appearing in this publication

"X" Dealers
get quick turnover

by pointing out to their customers the importance of "dosing" their radiators with "X" in order that it may weather the acid action of anti-freeze solutions and hard usage during the winter months. "X" is effective in alcohol as well as most any anti-freeze solution and, when used in combination, will save your customer many hours of inconvenience by preventing the leaks which are bound to occur during the cold season.

"Over three million cans sold every year"

"X" LABORATORIES, 25 West 45th St., New York
Factories—Boston, Montreal

"X" LIQUID
Repairs leaky radiators—
cracked cylinders and water jackets

REPAIR
ORD
WATER
MINUTE
EASY
TRUST

BREAK STRIP TO OPEN
SECTIONS DAY SEPT.

"X" REPAIRS
ARE
PERMANENT
REPAIRS

PRICE
\$1.50
In Canada \$1.75
WILL
DO A
\$25
REPAIR
JOB

DO IT
YOURSELF
IN
10 MINUTES WITH

CONTAINS NO CEMENT OR WEAL
TRADE MARK
X
THE WONDERFUL
LIQUID
RADIATOR
MEDICINE
CANNOT CLOG THE RADIATOR

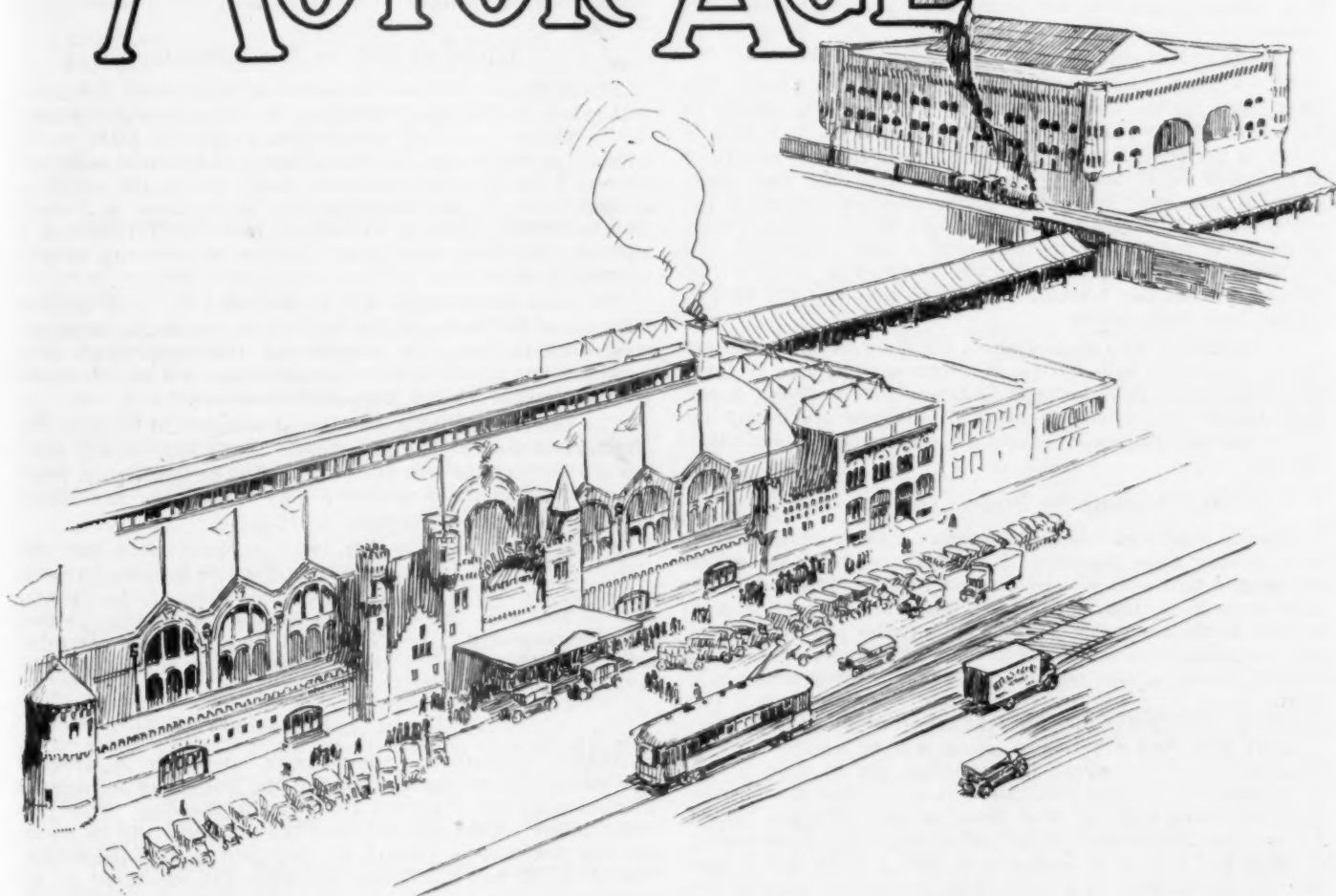
"X" WORKS
IN ALL NON
FREEZING
MIXTURES

REPAIRS LEAKING
AUTO-RADIATORS
AND CRACKED
WATER JACKETS
IN 10 MINUTES—MAKES
ENTIRE COOLING SYSTEM
LEAKPROOF—RUST-
PROOF—SCALEPROOF

POSITIVELY GUARANTEED

MANUFACTURED EXCLUSIVELY BY
"X" LABORATORIES
NEW YORK, N.Y., U.S.A.

MOTOR AGE



Now Comes the Chicago Show

Next Week the Automotive Capital Will Move Westward for Second National Exhibition and Its Accompanying Meetings

By CLYDE JENNINGS

NEXT week Chicago will become the automotive capital for one week. The show that made such an excellent impression upon the public in New York at the beginning of the show season, will be moved to the Coliseum and the Armory, where it is expected that the usual thousands of interested people will pay an admission to look over the newest offerings. The men, as usual, will grasp the sides of the bodies and make an effort to shake them, and the women will sit in the enclosed cars and feel luxurious for a time at least.

Will Rogers, in discussing the New York show, said that he had heard one woman complaining about the

increased number of enclosed bodies in the show and she had finished her complaint with the statement that "if they put more enclosed bodies in the show she would have to get a woman to help her sit in them."

In this comment Rogers noted what is really a marked improvement in the conduct of automobile shows. Any one who has attended shows over a period of years well remembers when most of the enclosed cars had ribbons on them to indicate that the doors should not be opened. It is different now. The salesmen, who are the kings of the exhibit, formerly put in their time making alleged humorous comment at the expense of the visitors and tell-

ing as little as possible to as few visitors as possible about their products. In fact the salesmen appeared to be under the impression that they were enjoying a vacation.

Now it is different. Most of the salesmen in the various exhibits are working. They are seeking the names of interested persons as a basis of sales which will make money for themselves and their employers and bring some definite returns for the manufacturer who sponsors the exhibit. The salesman of today realizes that the show is a money making opportunity, if he takes advantage of the trump cards that are put into his hands.

This is as it should be.

The Chicago Automobile Trade Association, while not responsible for the Chicago Show, is practically in charge of the sales efforts made there. This Association has been a leader in the effort to tune up the salesmen to take advantage of the show opportunities. This Association last year made a very definite effort to have all distributors and dealers in the city train the salesmen for the show and the Association went so far as to publish for the salesmen a show catechism, and for the most part the salesmen were trained in this. A few forgot all about this training as soon as they saw the crowds flowing past their exhibits.

The inspector who walked about the show each day to test out the salesmen with a view of recommending one of them for a substantial prize because he attended to business, heard many knocks, was often snubbed and, still more frequently did not get the information he sought as to the location of another exhibit.

Mass Meeting for Dealers and Salesmen

But the results of this training were evident and a similar effort is being made this year. A mass meeting of all interested dealers and salesmen will be held on Friday night before the show opens in an effort to impress upon the men who will be on duty at the show the value of opportunity offered to them and the great value to the automotive industry as a whole of courtesy, decent selling methods and other features that would appear to be very obvious to the man who must sell. The reports of other years indicate that this training is necessary.

Again this year a series of prizes will be awarded to the salesmen who best answer the questions put to them by an investigator. It is quite remarkable that this should be necessary. Salesmen seem to have queer ideals. They are placed in a position where courtesy and intelligence will make money for them and then it is necessary to offer a prize that is less than the commission on a good clean car sale to take advantage of the opportunity.

There is always one difference between the New York and Chicago shows. The New York show is to a certain extent an experiment. The manufacturers and their staffs go there more or less wondering just what the attitude of the public and the thousands of dealers who attend the show is going to be. The factory staffs are ready for any emergency and it is several days after the hosts have foregathered before they are able to define their program. In Chicago it is different. The New York consultations have cleared the air and the factory staffs come to Chicago ready to talk business along the lines developed in New York.

For that reason the manufacturers staffs are a bit slower in arriving in Chicago than in New York. But there is, perhaps, a somewhat greater dealer contact in Chicago than in New York. It appears that more small dealers come to Chicago to get the factory attitude than in New York. The program for dealers' meetings during the show here promises to be a heavy one. The programs for these meetings will be backed by the New York experience.

There will be much organization activity during the week. The big annual dinners that are a feature of the New York show will be lacking. The dinners announced for the Chicago show week are the National Automobile Dealers' Association at the LaSalle on Monday night and the Society of Automotive Engineers at the Congress on Wednesday night.

The N. A. D. A. Meeting

The N. A. D. A. meeting will open Saturday at the LaSalle with a directors' meeting. The regular sessions of the Association will begin on Monday at the LaSalle and will comprise

one of the most pretentious and serious programs on the merchandising of automotive products that has been attempted. General Manager Vane has been conducting some extensive investigations into the cost of merchandising and the used car situation and these reports will be a part of the discussion which will be led by Richard Lennihan, Assistant Director of the Harvard Bureau of Business Administration. In this discussion the direct information as to the cost of doing business in a transportation store will be compared with the costs in other lines of business which have been investigated by the Bureau.

Tipper to Talk on Merchandising

Harry Tipper, business manager of Automotive Industries, will speak on "Future Tendencies of Automobile Merchandising." Tipper has long occupied a prominent place in the advertising world and has been a leader in business paper and general advertising organization work. He is the author of several books on merchandising and his writings in Automotive Industries, several of which have been reprinted in MOTOR AGE, have given him a position of authority on merchandising subjects.

The used car problem will be discussed by L. B. Sanders, Manager of the Boston Statistical Bureau, which has done such good work in used car information that it is about to be expanded into a New England organization, and Guy S. Garber of Saginaw, and W. Pitt Barnes of Cleveland.

The entertainment for the annual dinner will be under the direction of the Chicago Automobile Trade Association, which has always been the host at this dinner. The Association promises to maintain its reputation. The speaker for this dinner has not yet been announced.

General Manager Vane has made it quite plain that this annual meeting is to be entirely devoted to constructive subjects and there will be no begging for funds, as the Association is now able to conduct its finances privately. Dealers who are interested in the N. A. D. A. and those who are interested in better merchandising, which means more profit, are invited to these sessions.

The S. A. E. Session

Another meeting that should be of interest to all progressive dealers is the day's session of the Society of Automotive Engineers at the Congress Hotel on Wednesday. This is a maintenance session and for once the engineers will be listeners and not talkers (except as they join in the discussion). The S. A. E. has made the following announcement of the program for the day:

"The Flat-Price system of rendering service to automobile owners is here to stay. Just a few minutes' study of the results accomplished where it has been applied, convince even the strongest skeptic that this is the truth.

"Don T. Hastings will read an unusually valuable paper at the Chicago Meeting, Jan. 31, giving all the details of a successful flat-rate system. Mr. Hastings was formerly an engineer with the Hupp company, but has been their Detroit distributor for the past few years. He has applied engineering analysis to the problem of rendering satisfactory service. His success has resulted in Hupp dealers visiting his plant and installing his methods in Hupp stations all over the country. He will show forms used in accounting and describe shop methods. This meeting starts at 10 o'clock at the Congress Hotel.

"Otis C. Funderburk, Lincoln-Ford distributor in Boston, will read another paper on flat-rate service at the afternoon meeting which starts at 2:30. Mr. Funderburk is an engineer by training and has developed flat-rate service to the point where some of his charges for major repair operations are surprisingly inexpensive. He will tell how to cut the cost of automotive repairs.

"J. F. Page believes that the kind of service co-operation needed between the manufacturer and the men in the field is the kind that assists and encourages as well as supervises and dictates. Mr. Page is head of the Packard-Chicago service organization. A number of constructive suggestions will be given in his talk following the paper by Mr. Funderburk.

"A. H. Packer, well known to the readers of MOTOR AGE

as an automotive electrical expert, will read a paper on 'Benefits of Electrical Equipment Standardization to Maintenance.' Packer's previous work assures that this paper will be practical and fully understandable to dealers and maintenance managers. This subject is especially pertinent because of the movement under way to promote the standardization theories of some years past. The maintenance men can do much to promote this movement if they will.

"All service men are welcome at these meetings. If you cannot come yourself, be sure and send a representative."

The worthwhileness of the dinner on Wednesday night is fully assured by the speakers. Godfrey H. Atkin, best known as Tommy Atkin, has been drafted from the electrical industry as toastmaster. Edward S. Jordan, president of the Jordan Motor Car Co., will be the chief speaker.

Certainly this is a dealer layout of which any engineering society might well be proud.

Manufacturers to Hold Dealer Meetings

These are the chief meetings of general dealer interest. A number of factories have announced meetings for their dealers, but this list is far from complete at this writing.

Meetings of restricted interest are the monthly meeting of the N. A. C. C. directors. Another N. A. C. C. function will be the meeting of the advertising managers' council of the Chamber. This has been announced as a closed meeting and is under the chairmanship of Edward S. Jordan. Factory advertising of passenger cars will be discussed on Monday and of trucks on Tuesday. Just why dealer advice on such an important sales subject is not wanted is not entirely clear.

N. A. D. A. Program

The Advertising Managers' Council of the Motor and Accessories Manufacturers' Association will meet at the Congress Hotel on Wednesday. This group is seeking suggestions from the outside. The program as announced is:

The theme selected is: "How Can the Parts and Accessory Manufacturers Aid in the Development of the Market for Specialized and Fully Equipped Cars and Trucks?"

The program follows:

1. Introductory paper by the chairman, Ezra W. Clark.
2. The Theme in Relation to the Car Manufacturer (speaker to be announced).
3. The Theme in Relation to the Dealer, by Clyde Jennings, Editor, MOTOR AGE.
4. The Theme in Relation to the Parts Manufacturer (speaker to be announced).

LUNCHEON.

5. The Theme in Relation to the Advertising of the Parts Manufacturer (speaker to be announced).

6. The Theme in Relation to the Value of Accessory Equipment (speaker to be announced).

7. The Theme in Relation to Advertising Copy Appeal, by E. C. Tibbitts, central manager Wm. M. Rankin Co., Akron, O. (formerly advertising manager of the B. F. Goodrich Rubber Co. and ex-chairman of the Advertising Managers' Council).

8. The Theme in Relation to What Equipment Should be Featured on Cars and Trucks Going Into Export, by Gordon Lee, export manager, Yellow Cab Manufacturing Co., Chicago.

The Automotive Electric Service Association will meet at The Congress on Monday and Tuesday.

So far this article, which purports to be about the Chicago Show, has said mighty little about the show. In fact, there is very little to say. Sam Miles, who has managed all of the shows in Chicago, is in charge, which assures success from the show point of view. Miles opened his Chicago office in the Coliseum last Monday, leaving New York only a few hours after the show closed there. In the main, the exhibits will be very similar to those in New York. There is a possibility that there will be one or two cars in the show that were not at New York. Several accessory displays will be at the Coliseum that were not at New York.

There will be the usual number of associated exhibits. The chief of these will be the Automobile Salon at the Drake Hotel, where the leading foreign cars and many custom made bodies will be exhibited. This is to a large extent a Chicago edition of the Automobile Salon that was held at the Hotel Commodore in New York some weeks ago. Then there is the "Free Admission Show" in the Greer Building next to the Coliseum. The usual demand for store room space near the Coliseum is reported.

Probably the biggest feature of the week for the dealer will be the activity of the factory sales-managers in seeking new and additional dealers. All factories are much alive as to the need of better and more dealers and they are all making proper overtures to dealers. At the New York show quite a bit of the shifting of lines among dealers was reported.

A Radical Idea on National Shows

Recently there has been considerable discussion in MOTOR AGE as to the most profitable time for holding shows. This inquiry has gone far enough to establish the fact that neither dealers nor manufacturers are entirely agreed upon the best date. Also it developed that there is considerable difference of opinion as to just what a show is for, and just what the results of the shows are. But none of the MOTOR AGE correspondents went as far in radical ideas as Norval A. Hawkins of the General Motors Corp., who would do away with the shows entirely. Hawkins' view on shows is published in connection with this article.

What do you think of it?

23 Years Ago This Week In Motor Age

(From MOTOR AGE of Jan. 25, 1900.
A Show at New York

NEW YORK, Jan. 22 (1900)—Staff Correspondence.—To the expert or enthusiast, the motor vehicle exhibit at the Madison Square cycle and automobile show is a distinct disappointment, considering the fact that one has been led to believe, because of the rapidly increasing number of new automobile manufacturers, that the industry has been developing with great celerity. (It is stated that limitations of space largely accounted for the small number of exhibits.—Ed) * * * Soon after the opening of the doors on the first night, the crowds began to drift toward the automobile space and, while the interest displayed by the majority might not have been exercised in a highly learned or technical fashion, its enthusiastic nature was sufficient evidence of the willingness on the part of the American masses to keep abreast of progress, and to offer each new develop-

ment in the motor vehicle game a hearty welcome.

Cover Illustration

The cover illustration of the present issue of the MOTOR AGE shows the "park phaetonette" manufactured by the St. Louis Motor Vehicle Co. The carriage is fitted with a six horse power gasoline motor, has 34-inch wire wheels, ball bearing to front wheels and roller bearings to rear wheels, and may be had with either 1 1/4 inch solid rubber or 3 inch pneumatic tires. Its maximum speed is 18 miles an hour.

Modernizing the Government

WASHINGTON, Jan. 19 (1900)—The librarian of Congress has asked for an appropriation of \$1845 for the purchase of an automobile for the use of the library. At present a horse and wagon is used for the delivery of books to members of Congress, at an annual cost of

maintenance of nearly one-third what a motor vehicle would cost. The librarian points out that an electric automobile would cost almost nothing to operate, as the library has a powerful electric plant at which the storage batteries could be charged as often as necessary. It is claimed, therefore, that the purchase of an automobile would be real economy, besides giving a better service to patrons of the library than it is now possible to do.

Current Brevities

Alencon, France, boasts of an automobile ambulance.

Akron, Ohio, is to have a motor patrol wagon, the vehicle being almost completed.

The "first automobile in the United States" threatens to become as numerous as the "original McKinley man" of whom we heard so much not a great while ago.

The Loomis Automobile Co. have what they claim to be the lightest auto for carrying two people yet shown. It weighs only 315 pounds and was shipped to the New York show by express.

Why a New York Show at All? Asks Hawkins

BY NORVAL A. HAWKINS

Sales, Advertising, Service, General Motors Corp.

DETROIT, Jan. 17.

NATIONAL automobile shows, as held in recent years and as exemplified by the latest New York show, typify the extravagant methods which characterized the industry in its period of early growth. Under present conditions it would be very difficult, I think, for any company to justify, by any tangible return, the expenditures entailed by the New York show and activities directly related to that highly colored affair.

The New York show, as I saw it, accomplished little or nothing that could not have been accomplished by sound business methods at much less expense. I take it for granted that men who are responsible for merchandising motor cars are sales men rather than show men.

In the early days, the New York show served to attract dealers from all parts of the country and provided a convenient means of making dealer contracts. Today, automobile companies which are properly organized have a staff of men who carry on such work in a systematic and orderly way. Good dealers do not need to be brought to New York and treated to a series of cabaret performances for the purpose of inducing them to take on a reputable line of cars.

So far as the general public is concerned, there may be some benefit from the focusing of New York's attention on motor cars, but

I doubt if the automobile business, in a large sense, is improved by having people pass from car to car as if they were in a zoo with a tiger in one cage and a rhinoceros in the next.

Such methods must have a confusing effect, many buyers being left with a multiplicity of impressions which would increase the difficulty of making an intelligent selection, as a rule. The moulding of opinion favorable to a certain make of car is a process which requires time and careful handling. There may be an occasional buyer who makes a decision as a result of an automobile show, but occasional buyers do not justify the expense of shows.

Assuming that it is desirable to have an automobile show week, I believe it could be made more effective and less expensive by staging each make of car in the retail establishment devoted to that particular line. Most buyers are no longer interested in the details of chassis construction. They are interested in body lines, upholstery, fittings, finish and appointments. It was quite evident that the principal interest at the New York show was in this direction. Doesn't that point strongly to the advantage of deliberate inspection in the individual show rooms?

As usual, the New York daily newspapers passed down the reception line of space buyers, each solicitor carrying the trumpet of

publicity in one hand and the collection box in the other. Pages upon pages of valuable space were consumed in creating a blur of impressions from which no company could possibly derive any permanent good. Add to this scores of expensive banquets, tables provided with too much food and entertainers none too modest, and you have a picture which does not present the industry in a constructive light. Once it was considered necessary to do this business as a game, but today it is no longer necessary or even justifiable.

It is very desirable to bring dealers together in a pleasant fashion when there is some definite message which is important for them to hear. Such meetings can be held at central points throughout the country without undue extravagance and with better provision for getting things done.

If conditions warrant the public display of various makes of cars, this could be arranged by establishing in Detroit a permanent exhibition which would represent the industry as a whole. As new models were brought out they could take the place of the old ones. Dealers interested in looking over different lines could have access to such an exhibit all the year round. Such an exhibition could have dignity and character more in keeping with the importance of an industry which now takes first place in the world's output of finished goods.

Review of Theatre Attractions During Show Week

Shows in Chicago, during show week are like a hot-dog sandwich to a big dinner. "The big dinner," of course, is at the Coliseum and there are numerous other feasts where the visitor can go and eat his fill of things that will be helpful to him in the pursuit of his work back home. But perhaps there will be some who would like to nose around at the theatres and see a movie, some vaudeville or something else.

Gazing over the forecast for show week, it might be said that "Sally," celebrated Ziegfeld affair, will be open to all comers at the Colonial, and Marilyn Miller and Leon Errol will do their stuff in their usual snappy manner. Elsie Ferguson will be in her last week at the Blackstone in "The Wheel of Life," heralded as a new play of love.

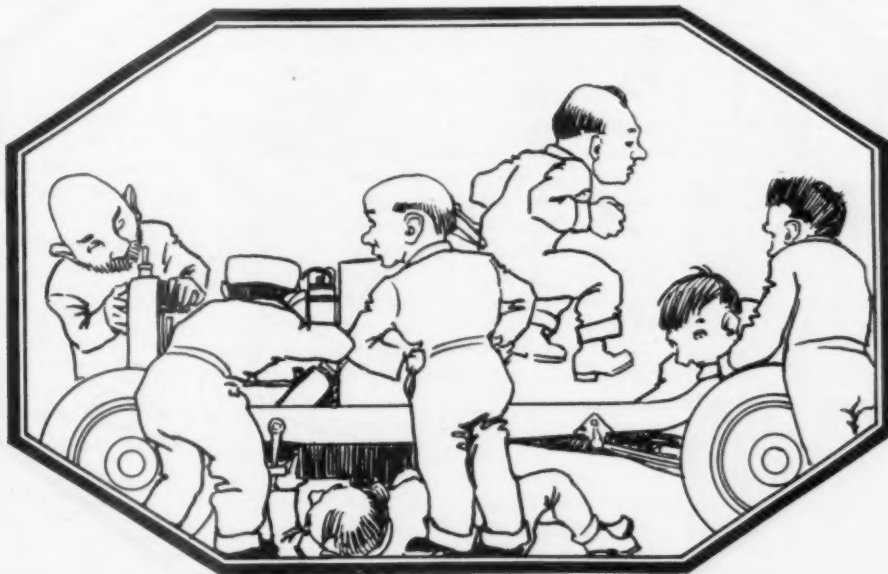
Frank Craven continues to have it out in "The First Year" at the Woods, while Mrs. Fiske, in "The Dice of the Gods," presents something more serious at the Cort. It is quite safe to say the comedy, "So This Is London" will be in full swing at Cohan's Grand, and Grace George will be in her first week in "To Love" at the Playhouse. "The Cat and the Canary," the much talked of mystery play at the Princess, has many a thrill in its line. Competition for "The Cat and the Canary" is to be seen at the Great Northern, where "Zeno" is acclaimed the "spookiest of all thrillers."

Eddie Cantor will frolic and warble at the Appollo, while Barney Bernard and Alexander Carr get in and out of some comical situations at the new Selwyn. Wallace Eddinger and Mary Nash should be at work in "Captain Applejack," which has to do with pirates and the like, at the equally new Sam H. Harris palace of playful things.

The Illinois at present boasts of "Elsie," "a regular girl," in the shape of something musical, while the Olympic has "Shuffle Along," hailed as the best musical show of the season. Made up of a flock of musical, dancing colored folk, it ought to be. William Hodge in "For All of Us," had a compliment from Henry Ford when he said it was the best play he had ever seen—the Studebaker sells the tickets for this. "The Twist," at the La Salle, has for its author Vincent Lawrence, which possibly means nothing to you, but according to a local critic, "it has a good catch." Use your own judgment.

But the movies—they constitute another afternoon or evening. Programs at these houses are always loaded with lots for the money. The Chicago, the Roosevelt, McVickers, the Randolph, and many other loop houses always have first run pictures. One thing Chicago can boast of is a flock of dandy movie houses, to say nothing of the vaudeville which is always on tap at the State-Lake, Rialto, Majestic, Palace and Garrick.

Day by Day in a Maintenance Way Cars Get Better and Better



Designing and Production Have Joined Hands to Make the 1923 Car Excellent Product From Service Standpoint

TAKING the 1923 car as a whole it is the most accessible car the industry has produced. Progress has been made in design, construction, production and inspection methods and the makers as a general thing are giving careful thought to maintenance of the product after it leaves the factories.

THERE is no one point on which we can place a finger and say that it has received the bulk of the maker's attention. Refinements have taken place from one end of the chassis to the other. Even on cars which have remained substantially the same as the former models, there has been a little touch of refinement added here and there which not only has resulted in a better car, but has made the maintenance man's job easier.

IT IS impossible to make a chassis or car which will be 100 per cent accessible. But in nearly every case our makers have made those units accessible, on which it is necessary to perform the most frequent maintenance adjustments and repairs. This is as it should be for supposing a certain unit is inaccessible, but need not be touched in 2 years; there you have a case where better design and fabrication of the unit has offset whatever disadvantages might be found in its inaccessibility.

THERE is a growing tendency for stiffer frames. Tubular cross members are to be found in most of the new designs. This is true of the cheap cars as well. Deeper side rails also feature the new frames and the desire for a flexible frame seems to be waning.

THERE has been much accomplished in the matter of handling fuel. Manifolds have been redesigned, hot spots added, temperature control devices have been added

to regulate the cooling water heat and steps have been taken to reduce crankcase oil dilution to a minimum.

IT IS easier to lubricate the 1923 chassis. Pressure systems in most cases have replaced the old type of oil and grease cup. Several cars are fitting a pressure oiling system for the chassis in which the oil is sent to all parts by operating a small hand pump on the dash. The use of certain parts like the fabric universal joint, fabric mountings for torque arm front ends and fabric spring shackles has eliminated lubrication of these parts.

COMING to the electric system an outstanding feature of most engines is the accessible mountings of the ignition unit. Also the wiring has been simplified. It is easier on many cars to disconnect the body from the chassis because the junction block has been better located and the wires have been concentrated at one point.

BODIES are better built. Anti-squeak material is being more generously used even at points where heretofore it was never used. Several makers paint the wood framework before the metal is applied, an excellent procedure for preventing moisture from getting into the joints and eventually setting up squeaks. Body hardware is stronger and coachwork generally is better executed, being augmented by high grade upholstery material.

CARS for the most part are more completely equipped this year than ever before. In doing this the makers have built their chassis with integral brackets for bumpers and similar fittings, thus making sure that such parts will not become loose in service as frequently is the case when the maintenance man is called upon to add these fittings as best he can.

Building Service into the Car



Car Makers Have Built Longer Life Into Their Product. Better Facilities for Draining Oil. Larger and Better Brake Layouts Mean Less Trouble. Removable Tappet Blocks Handy. More Space Is Being Provided Around Chassis Units

THE cost of maintenance on motor cars will be less as time goes on, if full appreciation is made of the many things which the motor car manufacturers have done in the fabrication of their product. While there is no marked development in the last year in any one point which would indicate that service and maintenance costs will become materially less, it remains a fact that much has been accomplished which will,

First, make it easier for the maintenance men to handle the work and,

Second, make it less costly to the car purchaser to keep his car in proper operating condition.

The last mentioned condition is one that can be brought about to a large extent only by the former, hence the bulk of this article will be devoted to a discussion of how better construction and accessibility of the present day motor car is bound to reflect in the maintaining of the product by the dealer's service station.

It is a more or less well established fact that in the past sales on motor cars have been limited often by the high cost of maintenance. Much of this high cost has been due to the lack of facilities by the dealer's maintenance department, but

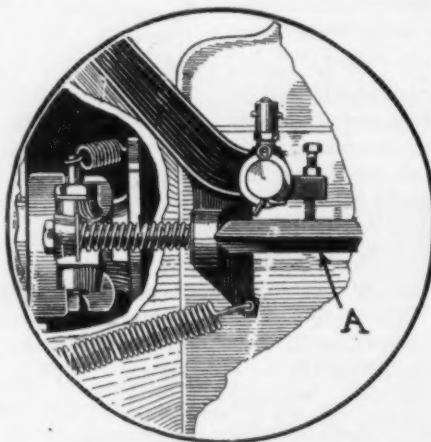
in addition there must be added the short-comings of the manufacturer in the way of turning out a product entirely too difficult to service economically.

In the past the factory very often looked upon the dealer's mechanics and trouble shooters as a class of inexperienced men and thought their complaints were wholly unwarranted. Today, however, the "men on the firing

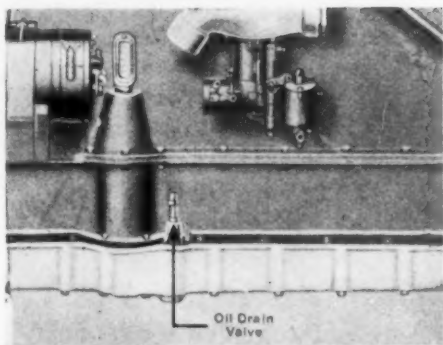
line" are having their inning and it is common to have suggestions from maintenance men seriously considered by the engineers at the factory when a new design is contemplated. Many new designs have been influenced by the service reports coming from the field and the recommendations of maintenance men qualified to make them.

Car manufacturers are building longer life into their product. Elsewhere in this issue there is printed an article dealing with the production processes which are materially adding life to the cars and lessening the need for adjustment and repair. Better foundry practices, better core making, heat-treatment of steels, more accurate machining, co-operation on the part of machine tool makers in bringing out precision machines, better factory inspection, and similar things all are helping make the car of today the best in the history of the industry.

As an example of the machine work and construction going into some of our cars, we cite here what a service manager recently told a representative of MOTOR AGE. The car in question is a high priced car. In a discussion of the flat rate plan of selling service for this



Outside clutch adjustments facilitate maintenance operations. This shows the one on the Buick, A being the adjusting nut

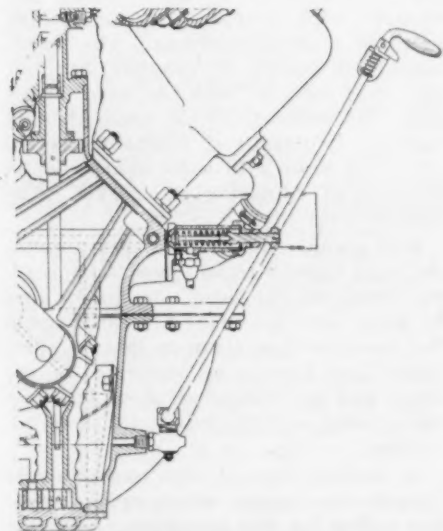


The accessible oil drain device on the Marmon engine. It is operated with a wrench

car the dealer's service manager said that he had as yet been unable to establish a set of prices on various operations on the car because there had been, as yet, no need for doing any of the operations on the car. This, in spite of the fact that the dealer had some forty or so cars of this make in his territory. Some of the engines in these cars had run over 50,000 miles and there had been no need for taking them down. While this is possible probably in a high priced car, it is true also that even the medium priced cars are "standing up" better than formerly.

Obviously, in an article of this kind, it is impossible to go into detail on the materials entering into the construction of a motor car and it must suffice that we assume here that the steels and other material fabricated into the modern motor are of the best quality. Then, what is there to say regarding the features of better construction?

There is no one thing which stands out prominently in this respect. There has been a steady gain during the past few years in making cars easier to maintain, both from the dealer's standpoint and that of the customer, in the matter of making the cars more accessible generally, by which we mean making the more obvious things with which the



The convenient oil drain device on the Peerless. A spring insures against accidental opening of the drain

owner comes into contact frequently, accessible.

For example, there is the question of oil draining facilities. The car maker and dealer tell the car owner to drain the oil every 500 miles or so, but has provision been made to do this readily? In the past, no. But today there is more and more tendency for the makers to fit devices to their engines by means of which the crankcase oil can readily be drained, without a man having to get underneath the car with a wrench and unscrew a plug. There have been several cars in the past fitted with facilities for draining the oil from above and this year we find a few additional car concerns featuring this in their engine.

Many will ask, no doubt, what advantage this has as regards maintenance cost. The answer to this lies in the fact that in the majority of cases the car owner is careless about draining the oil frequently and especially will he neglect it if it is made a difficult job. By the dealer's maintenance man being able to show a customer how easy it is to drain the oil from above, naturally the customer will be more likely to follow instructions.

Then there is the dealer's side. Many customers entrust all of their adjustments and maintenance work to the dealer's service department and when the dealer is able to tell the customer that it is but a moment's job to drain the oil, the customer does not mind leaving his car and waiting a few moments. And it is far more desirable to the dealer's maintenance department to be able to have a mechanic easily drain the oil without having to crawl underneath the car and come out with dirty oil dripping from his hands.

Making the Obvious Things Accessible

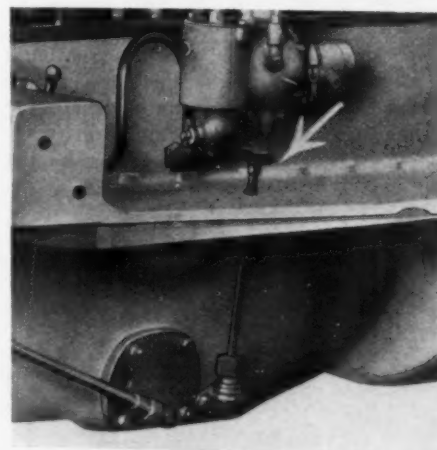
Some of the other more obvious things which have been made accessible are the radiator caps. Many makers now are fitting the so-called "bar caps" which make it easier to unscrew a cap and also make it possible to screw down the cap more tightly. Mention might be made here also, that threads on the radiator cap and filler neck are more carefully cut with a resultant smoother action. The introduction of gaskets on radiator caps helps to keep a tight joint and thus prevent stained radiators and shells and hoods from overflowing water.

Then there is the matter of clutch adjustment. The clutch of a car is abused about as much as any other unit. For this reason it is desirable that the adjustment be so located that it is readily accessible. Several makers have provided exterior adjustments, so arranged that by merely working a thumbscrew the desired result is quickly attained.

Of late there have been numerous sport models brought out which are built with a trunk rack and at the rear and in many cases carry a spare tire or wheel in addition. Naturally, with the gasoline tank at the rear of the frame

this construction might involve some difficulty in the matter of filling the tank. But in nearly every case of this kind the maker has co-operated by placing an offset filler neck on the tank. This neck also has been located on the right hand side of the tank usually, to take advantage of the location of gasoline pumps at the curb.

More attention is being given to the matter of locating the storage battery. The erstwhile deplorable manner of placing the battery under brake rods or in almost immediate contact with a hot exhaust pipe seems to have entirely disappeared and today there are more and more makers placing the battery under the front seat. All things considered, this location appears to be about as near ideal as is possible, although there are



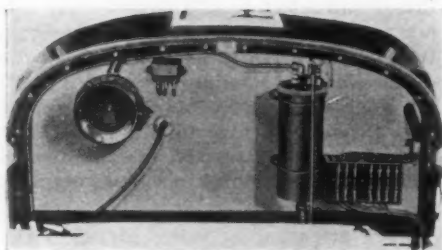
Chandler has an overhead oil drain located just under the carburetor

many who insist that the running board location, or between running board splashers and frame, is the best from the standpoint of the battery service station man.

For ready access, this probably is true, but with more and more makers tending to place the tools of car in a front door compartment, and the general tendency toward greater carrying space afforded on cars, the front seat location for the battery has all the more reason to recommend it. It is possible to make a good carrier for it and the battery can be better protected from dust and mud.

With the tendency toward the fitting of larger brakes, the need for adjustment becomes less frequent. In several cases the bands have been made slightly heavier and thus will hold their shape much better. Better machining of the drums and more careful assembly also contribute toward keeping the mechanism in the best operating condition. In the past many brake drums assumed a more or less oval shape after a little use, which naturally made an uneven application of the brake lining material and tended to distort the bands. All of this meant frequent relining and adjusting.

Brake adjustment means remain substantially the same as in former models.



The accessible dash of the R & V Knight. Note the junction block at the left of the dash. This makes an easy hook-up for the wiring

although in a few instances the quieting of the brake operating mechanism has received attention. There remains considerable work to be done as yet on brakes, particularly in the matter of cooling them.

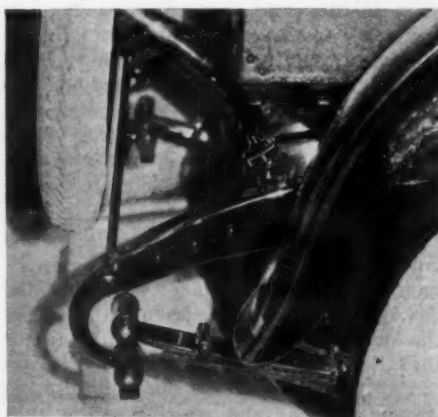
With the more or less conventional layout of brakes, wherein the outside contracting and internal expanding brakes operate on the same drum, it is but natural to expect the brakes will get very hot under severe conditions, because it will readily be understood that, with asbestos lining material on both the inside and outside of the drum, there is little chance for the heat to be dissipated. The lining makes an almost perfect insulation. In ordinary use this is not serious, but in very hilly or mountainous country it becomes quite a problem.

In some of the high priced cars, better cooling of the brakes is afforded by making both sets of brakes internal expanding in one wide drum. Thus the exterior surface of the drum is left free to dissipate the heat. Notable examples of this are Mercer, Stutz, Templar, Brewster, Haynes and Rolls-Royce. There is some tendency to make the brakes larger on medium priced cars. This naturally adds life to the brakes and lessens the strain and wear on the mechanism. Such brakes also will not have to be applied for as long a period as the smaller brakes to stop or slow down a car. One of the very recent examples of where one maker has gone from 12 in. to 14 in. brakes is Buick.

In the past, maintenance men have al-

ways had to adjust the brakes on a new car after it had traveled a few hundred miles, but now several makers, especially in the higher priced field, are giving to the brakes an initial burning-in at the factory and the surfaces having been properly adjusted to each other, there is no need for adjustment on the car when the dealer gets it.

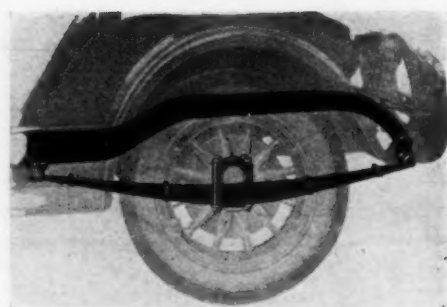
One of the things in line with accessibility is the adoption by many car makers of high pressure systems of chassis lubrication. The ordinary oil cup or grease cup placed in an inaccessible position is inadequate for proper lubrication. But with a suitable connection on the part for attachment to a pressure system of lubrication, there is practically every assurance that the part will get



Even with trunks and tires at the rear, the gasoline tank filler necks have been conveniently located

lubricant. Very often oil cups are placed on spring shackle bolts in such a way that an oil can cannot be tipped sufficiently to fill the cups, owing to interference from the running board splashers. Usually holes are cut in the latter through which the spout of the oil can is inserted.

Now, with a special fitting used in place of the oil cups and extending them slightly through the splashers, it becomes a simple matter to attach the apparatus for forcing in the lubricant. Some makers are fitting their cars with



Almost all of the rear springs are now underslung from the axles, which makes replacement easy should this become necessary

oil cups so built that by operating a small knob on the cups a very high pressure is quickly obtained and the oil positively forced through the parts in question.

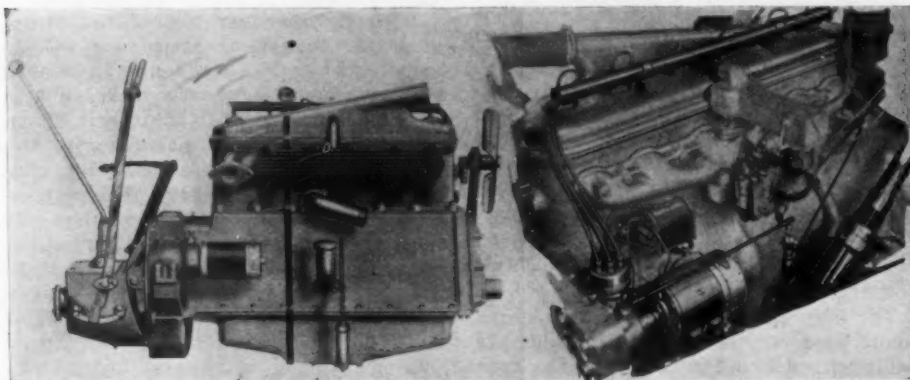
Better construction of some chassis details has eliminated the necessity for adjustment on some models. Thus, for example, the torque arm on the new Peerless has a fabric connection at the front end in place of the usual spring type of connection. This also does away with any possibility of rattle at this point. In another instance, that of Chandler, the abolition of the torque arm and adoption of Hotchkiss drive has eliminated altogether the necessity of adjustment. Still another maker has eliminated the necessity for adjustment by adopting a sort of flat spring mounting for the forward end of the torque arm. The spring is bent into a sort of oval shape and will adjust itself to variations in length of the torque arm caused by spring action.

Detachable Heads Big Help

There are an almost unlimited number of small improvements which make for greater accessibility and easier maintenance. The constant gain in the use of detachable cylinder heads has brought with it other features which help the maintenance man. The Continental 6-Y engine, for example, has four lugs cast integral with the head, which make the removal of the head an easy matter. Ordinarily a mechanic has to pry off a head with some sharp tool at the risk of damaging the gasket. The lugs prevent this.

Still another maker furnishes a cylinder head fitted with an eye-bolt for readily lifting off the head. It simply goes to show how the makers have in mind the more or less common service operations that have to be performed on engines and are taking steps to facilitate their being carried out to the best advantage.

In former days it was impossible to remove the tappets of an engine without taking off the crankcase, removing the camshaft and in other ways dismantling the engine. Today this is the exception, because in most engines the

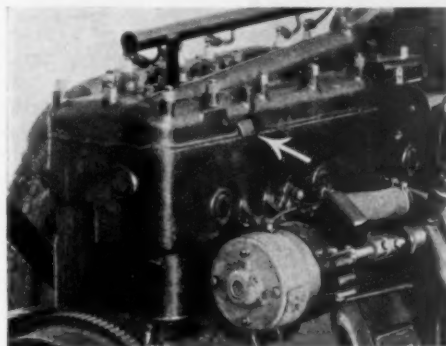


Two views of the R & V Knight engine, a study of which will show the ease of getting at the electrical units. Short wires are required between coil, generator and ignition unit

tappets can be removed by first removing the valves and then lifting out the tappets and guides as units. Sometimes the tappets are made up into assemblies of six, while in others they are made up in pairs. The general opposition to the assembly of six tappets into one guide block is that the block is too long and is apt to put too much stress on the cylinder block with variations in temperature of the parts.

Accessibility has been improved by better construction in the front end drives of engines using chains instead of gears. Most of the engines using chain front end drive are provided with an exterior adjustment for taking up the slack in the chain. Formerly this had to be done by removing the radiator, taking off the timing case cover and in other ways tearing down the engine. The exterior adjustment of chains has had a marked effect upon the speed with which maintenance operations can be carried out.

There is one thing, in regards to removal and installation of main bearings, which the Oakland company has adopted and which would seem to offer much food for thought for other makers, especially when giving thought to maintenance.

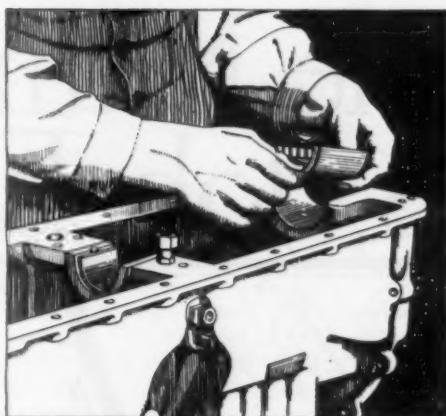


The Continental 6-Y engine has lugs on the cylinder head to facilitate removal without damage to the gasket

nance. The Oakland crankcase bearing seats are accurately machined, as are also the backs of the bearings. In putting in a new main bearing, the mechanic simply has to take out the old and put in the new bearing. It is not necessary to tear down the engine and line up the bearings.

This is one of the most important achievements so far, as its being a case of where the maker realizes the importance of the maintenance department of the dealer being able to quickly and economically install new main bearings. Most maintenance stations have not proper facilities for lining up bearings or line reaming them after the manner done in factories, hence anything that can be done by the engine and car makers to make main bearing work easier is a decided step in the right direction.

There are many other cases where the maker has made his car more accessible or easier to maintain. Where it has not been done through better construction it has been done through a re-arrangement of the units. Thus, where formerly a



The removable main bearings in the upper part of the Oakland crankcase make bearing replacement a very easy matter

generator or starting motor was inaccessible by virtue of interference from other units, such parts have now been made easier to get at. Distributors have been mounted separately on the engine and the removal of the generator does not interfere with the timing of the engine, as is the case where the two units are incorporated.

Carrying the exhaust pipe down the front end of the engine compartment, aside from keeping the front driving compartment cooler, also has the advantage of making the engine more accessible. Many makers now run the exhaust pipe after this manner and it is a thing readily appreciated by the service man. Especially is it desirable where the exhaust pipe is on the same side as the steering gear. The front end arrangement also makes it easier to take apart and re-assemble the flange coupling of the exhaust manifold and pipe. Then, too, it is easier to fasten the hot air stove for carburetor to the pipe.

Makers as a whole are providing more space around the units, so that special wrenches can be used to better advantage and the cap screws and nuts are far enough away from fillets so the wrenches get a good grip.

A detail which, on the face of it, would not seem to amount to very much, and yet one which has distinct advantages, is the fitting of the inspection plate on the front end of the Hupmobile cylinder block. The removal of this plate, accomplished by removing a few cap screws, exposes the water jacket space of the block and flushing out of the accumulated ferrous oxide or other deposits caused by the water and heat combination is easily accomplished. This is important in engines which have covered 50,000 miles or so.

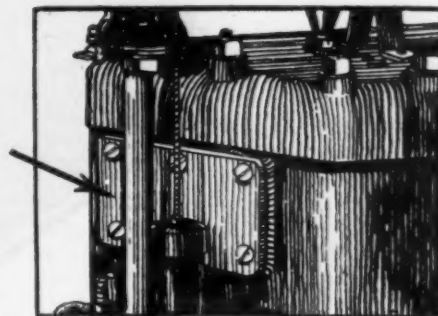
Lubricating Clutch Throwout

One of the things which is particularly noted in the newer cars is the better provision for oiling the clutch throwout bearing. In the past this bearing has been sadly neglected, especially where the clutch is of the dry plate variety. Makers used to tell the car owner to remove the clutch housing cover every so often and lubricate this bearing, but as

long as the car would operate sufficiently well the owner forgot all about the clutch throwout and ultimately it meant the installation of a new bearing.

The Kissel engine is an excellent example of where the maker has made provision for oiling the clutch throwout. Here a cup is placed on the engine and a lead extends downward to the clutch housing, enters it and ends at the bearing. There can be little excuse in such an installation for not properly lubricating this unit.

Practically all of the cars which use semi-elliptic rear springs undersling these from the axle. This makes it an easy matter to remove and install springs when this becomes necessary. In addition it allows of a lower body and frame suspension. There are several makers, however, who insist upon putting the springs on top of the axle, but where this is done the springs usually are attached to the side of the frame instead of directly underneath. This gives a high point of suspension with a low center of gravity.



There is an end plate on the Hupmobile engine, the removal of which makes it easy to clean out the water jacket

Practically all of last year's development work on clutches was directed to the dry disk or dry plate clutch, and of these chiefly the single plate type. This is not to be wondered at when we stop to realize that the single plate clutch is necessarily a light unit and therefore, has a very small moment of inertia. As a result of this it is comparatively easy on the teeth of the gearset.

Especially for use in light cars has the single plate clutch gained in popularity. On the various cars made by Durant the clutch springs bear directly against the pressure ring and their pressure is not multiplied by levers. The clutch pedal pressure applied to withdraw the clutch is thus multiplied, however, and the clutch is therefore, not difficult to operate. In fact, several manufacturers this year have changed their clutch designs, throwing mechanism, pedals, etc., to make it easier to withdraw the clutch. For instance, Chandler has lengthened the clutch pedal and reduced the clutch spring pressure, while Maxwell introduces a compound reduction motion between the clutch pedal and the throwout collar. Disengaging springs which pull the friction members apart when the clutch is disengaged, is the feature of some clutches, particularly in the Rose clutch.

Making the Maintenance Man's Job Easier



Production Accuracy Beneficial In Reducing Chances for Misalignment of Units. Inspection More Rigid on Raw Material. Crankshaft Balancing Big Factor in Longevity of Engines. Grinding Operations Replace Reaming Operations in Several Instances

A SERVICE manager out in the field who looks back over years of experience realizes that cars today are easier to service than formerly. There are several reasons for this. Primarily, of course, cars are designed for greater durability and a great many troubles which formerly were common are now almost unknown. The accessibility provisions are better. Parts which were formerly hidden are now open and readily removable and reached for service work.

There is another reason, however, for this improvement in the serviceability of the modern car which probably would not be readily suspected by the average garage man, but which, nevertheless, has a very material bearing on the simplification of service problems. This is the gain made in production accuracy during the past few years. Production accuracy has a beneficial effect in a great many ways. In the first place, it reduces misalignment, which is one of the chief causes for conditions making service necessary. Furthermore, it increases interchangeability, which, as any maintenance man knows, is one of the biggest aids in servicing an automobile.

Improvements in methods, machines and inspection have all combined to give a higher class product from an accuracy standpoint. This accuracy is reflected in maintenance costs in a very clear and well defined manner. It reflects to the benefit of the maintenance man as well as to the car user in that it facilitates the work in the shop and, consequently, has a direct result in the reduction of repair bills. One of the most effective ways in which to make a repair bill high is to incorporate in the work a number of hand operations, particularly such work as filling or scraping, or any of the other work which is necessitated by the lack of interchangeability of parts.

Replacing Main Bearings Quickly

A very concrete example of how companies are obviating this necessity is in the Oakland method of handling the main bearings. When a main bearing is worn out, the entire set of bearings is simply replaced by dropping new bushings into place. This has been accomplished by holding the limits of the machined part of the crankcase and also the machined backs of the bearings to such close limits that absolute interchangeability is secured. As far as the

surface against which the crankshaft bears is concerned, this is absolutely uniform because of the low pressure, die cast methods used in manufacture. These bearings are all cast around a carefully sized and inspected mandrel which makes the fit of the bearing positive.

This, coupled with the carefully machined backs and the carefully machined crankcase, provides an absolutely interchangeable bearing and, consequently, does away with the necessity for any hand fitting whatever. Furthermore, it removes all the problems of alignment and eliminates the necessity for line reaming operations, which requires equipment beyond that usually found in the small garage.

A great many manufacturers follow a very similar procedure in this respect with connecting rods. These have the babbitts die cast into place at the factory and the connecting rods with the bearings already for application to the engine are supplied the dealers and service stations. When a car comes in for new bearings in the connecting rods, the old rods are slipped out and the new ones put in place, the rods being returned to the factory where they are inspected and if in perfect condition, are re-

bushed and ready for another servicing operation.

Improved accuracy in manufacture is not found alone in the machine shop. In fact, it stretches all the way from the raw material right through to the finished product. Never has inspection been so rigid on incoming raw materials as they are at the present date. Good examples of this may be found in the case of several concerns who formerly only gave either a physical or chemical specification for steels.

A great many concerns, particularly spring manufacturers, axle manufacturers and those making units incorporating very highly stressed parts are using steel for which the manufacturer supplies both the physical and chemical specifications. These concerns maintain laboratories which take samples of the steel frequently both from the incoming shipments and from the parts in process to see that both the physical and chemical specifications are being adhered to by the source of supply.

Brinnell Test Much Used

There is a marked increase all through the industry in the use of the Brinnell hardness instrument, which, in the hands of a steel expert, tells a great deal of the qualities of the metal. This has resulted in a greater uniformity in the parts produced. This same quality is also secured by the fact that the temperatures of the ovens used in heat treating are held to much narrower ranges than formerly.

Not many years ago it was necessary for men in the heat treating departments to walk up and down in front of the furnaces examining the thermal devices for registering temperature on each individual furnace and then flashing a warning signal of either a red, white or blue light to the man at the control station some distance away. Between the time that the men had discovered a drop or a rise in temperature in one of the furnaces and the change in the mixture going to the furnace, a big variation would be apt to occur. Today, automatic devices are employed which hold these temperatures to such a narrow range that no perceptible difference can be found in lots of steels coming out on different days or different periods during the working day.

All of this seems somewhat remote from the maintenance stand and yet, it is one of the factors which is responsible for reducing what might be called the unexpected breakage or wear in automotive parts.

In the foundries we find a marked tendency toward more uniform castings. There is not a foundry in the country which has been in operation for a period of years which will not state that the percentage of rejections has been materially reduced during the past few years and, furthermore, with this reduction in rejections has come a more closely adhered to standard of inspection, which has resulted in better castings. One of

the points in foundry practice which has been responsible for better castings is the use of permanent and semi-permanent molds. A great many castings are made on these now which would have been considered impossible from that standpoint.

Mechanical conveyors in the foundry which more rapidly move the molten iron and, consequently, provides better pouring temperatures than the old hand methods, are also responsible for the improved grey iron semi-steel castings which are now coming through. These better castings are easier to machine. They do not, at least with the same frequency, have the hard spots which were always a cause of trouble in the machine shop in past years. This does not mean that hard castings have been altogether eliminated for we still have epidemics of this trouble, but it has been decreased to a great extent.

More uniform castings make for greater accuracy in the machine parts and consequently, tend towards helping for better fits between piston and cylinder, for example, or at other points where the casting must be held to close limits. When a tool strikes a hard spot in the casting, a chatter results, the tool tending to ride up over the hard spot and dig down immediately behind it into the softer metal, giving an irregular surface which is sometimes not cured in the grinding operation.

Another big point in foundry work is the greater knowledge of how to take care of the expansion problem in the elimination of large pieces of metal con-

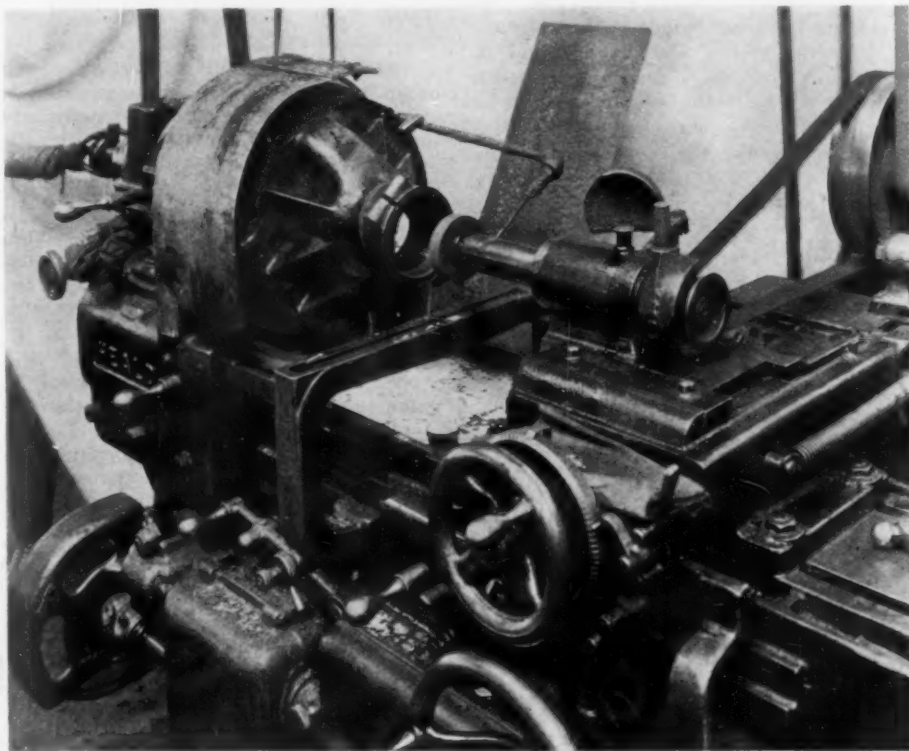
centrated at one point, causing the expansion to be greater at that point than elsewhere throughout the casting and, consequently, giving distortion even at ordinary engine temperatures.

Much of the refinement in castings may be traced to the pattern shop where patterns are now being worked out so accurately that it is possible to get the casting wall extraordinarily thin. On the smaller parts, such as the piston, it is now possible with the metal cores to cast walls down as thin as 1/16 in. A good example of this in a rather newly designed engine is the Rickenbacker, where the thinnest walls are .030 in. thick, the castings being only 3/32 in. in the rough and the cores held within .005 in. of being round, whereas with the sand cores, an allowance of from 1/64 to 1/32 in. out-of-round is customary.

Keeping Same Piston Weight

From a maintenance stand, this means that piston variations in weight are considerably less, and on a replacement proposition he has not to make the same effort to secure a proper balance as formerly. A maintenance man who does a good job on a reboring operation is, of course, always careful to see when new pistons are installed that each one of the entire set weighs about the same, a 1/4 oz. variation being all that should be tolerated. With pistons coming through with the desired uniformity, as secured by the latest foundry practice, there is not much need of hand filing or turning to properly match the pistons up before assembly.

Looking into the machine shop end of



This is the special machine which Hudson and Essex use for grinding the bore of the pinion bearing case. Very close tolerances are held on the grinding operation which replaces the former operation of reaming

manufacture, it would be possible to write volumes on the improvements in accuracy which are reflected in easier maintenance. There is not a unit in the car that has not been improved upon during the past few years from the standpoint of uniformity and accuracy. It may truthfully be said that the improvement in practice in machine shops since the armistice has been equal to that of the previous 25 years, as far as accuracy is concerned.

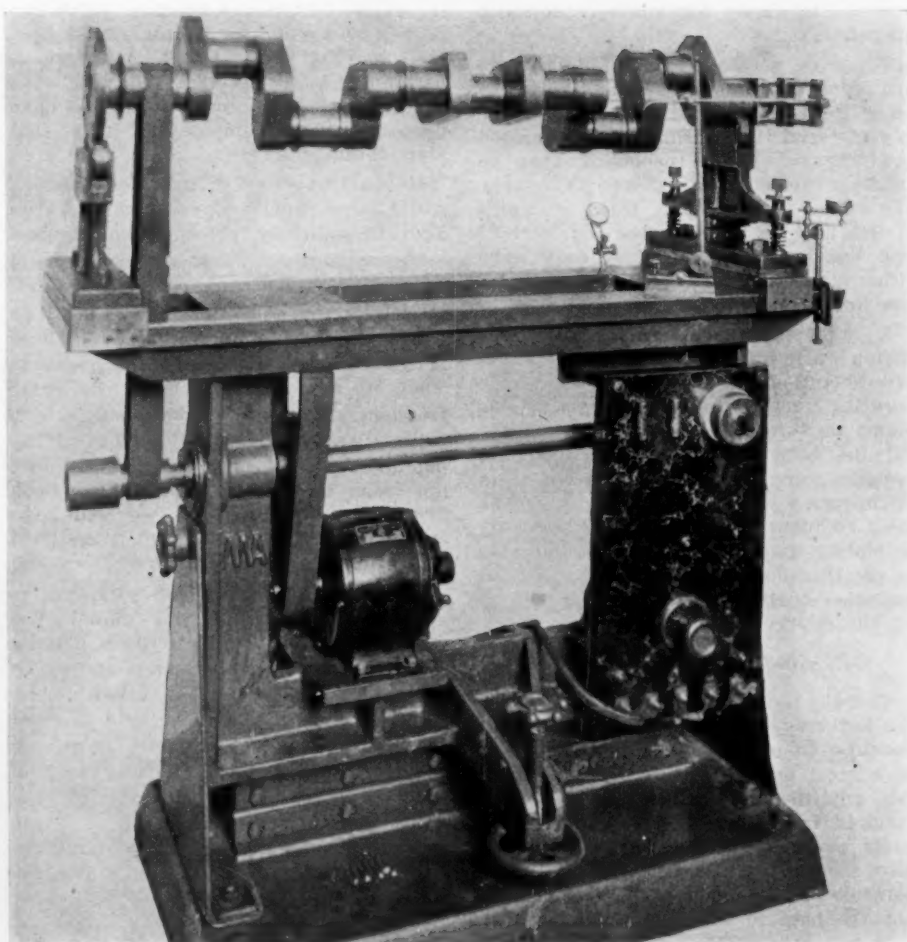
One of the points which immediately suggests itself to the service man's mind is the fit of the piston in the cylinder barrel. In spite of the fact that cylinder walls are thinner than previously, there is not nearly the same distortion in shape, due to the variation in engine temperature between a cold engine and one which is running even in an overheated condition. Experienced maintenance men well remember the time when it was not unusual to find evidence of elliptical cylinder bores and elliptical pistons on engines which came in, particularly with oil pumping and piston slapping troubles.

Artificial Aging Big Help

This has been corrected by improved pattern work which establishes more uniformity in the thickness of the metal throughout the casting. Where there are no large lumps of metal, it is unlikely that distortions, due to unequal rates of expansion in the different parts of the casting, will exist. Furthermore, improved methods of artificial aging and more careful annealing of castings have materially reduced, if not altogether eliminated, castings in which internal stresses existed.

With the piston, it has, of course, been practiced for some time to grind a relief at the end of the piston boss and in fitting new pistons or pistons bought on the outside, maintenance men should be careful to note that such a relief is turned or ground on the piston if it is necessary. This is usually provided in the replacement piston, but there are instances of pistons which are provided by piston specialists in a practically raw condition in which it is necessary to take care of this point. The amount of metal to be turned off varies with the bore and with the thickness of the boss, but generally it is an eccentric relief which is somewhere around .005 directly at the end of the piston pin boss and tapers into nothing at a distance of about 1½ to 2 in. on either side of the boss, measured around the periphery.

Vibration causes noise and wear. Reduction of vibration is secured by balancing the rotative parts and cutting down the weight of the reciprocating parts. It is also secured by equalizing the weights of the reciprocating parts in the cylinders. Today, in a great many of our automobile factories, balancing machines which were formerly considered laboratory tools are in actual production use. For example, at the Packard factory, every engine is run-in on a stand until the frictional horsepower, as shown by the amperes required



Many crankshafts today are balanced on special machines which in the old days were looked upon as laboratory apparatus. This shows the Akimoff No. 1 balancing machine which is very sensitive and quickly detects crankshaft irregularities

to drive the engine at a certain speed, fall to a required figure.

After this point has been reached, the engines are taken from these running-in stands and put on dynamometers, where they are put through a series of tests, and a form which looks like a laboratory chart is completely filled out, giving the characteristics of the engine. In order to meet the requirements which are found on this chart, the engine must have been very thoroughly balanced before its assembly.

Balancing of Parts

Every crankshaft is put through a balancing machine and all of the reciprocating weights are carefully checked and held within close limits and the engine so assembled that the weights of the pistons and connecting rods, etc., are very closely the same in each cylinder. This process of selective assembly is followed in all automobile plants and an ever increasing number of them are using the balancing machines on a production basis. At the Hudson Motor Car Co., for instance, which is now equipped with a sufficient number of these crankshaft dynamic balancing machines to take care of the entire production, a material gain in freedom from vibration has been noticed.

It is quite a common demonstration in the dynamometer room of this plant,

in taking visitors through, to place a five-cent piece on edge on the top of the cylinder block and speeding the engine up to between 1500 and 2000 r.p.m. without the engine showing sufficient vibration to upset the nickel. This freedom from vibration, which is now being found throughout the industry in our production engines, is resulting in much longer life for these power plants and also for the other chassis units which are materially affected by engine vibration.

Taking up some of the other chassis units, the clutch may be cited as an example where better materials and more careful workmanship are resulting in greater durability. On the Buick clutch, for instance, this year, the clutch housing is now drop-forged steel instead of malleable iron. The splines are now case hardened and ground and the clutch plates are fitted to closer limits on the splines and pins. This will decrease wear and obviate rattles. Nash has also made a change in its clutch, particularly in the clutch shaft. This is still a splined type, but is now ground on all sides. The splines are now individually hand fitted, resulting in the claim for easier shifting and longer life.

A practice which is growing through the factories as a method in which to secure positive alignment between the crankcase and the clutch housing, which is generally bolted to it, is to wait until

the main bearings are finished and then to pilot the tool which cuts the engaging surfaces on the clutch housing and the crankcase from these bearings. This will give positive alignment between the clutch shaft and the crankshaft and works out better than using the flanged surfaces for location.

Speaking of alignment of the various shafts throughout the car, mention should be made of the great tendency toward more accurately finishing all housings, consequently, allowing less variations in bearing mountings. Very often a good bearing is destroyed because of poor alignment or inaccuracy of the unit in which it is mounted. Even a slight degree of misalignment in the supporting members for the gears and bearings in the rear axle is sufficient cause for extremely rapid wear. In fact, the ac-

curacy required of bearing manufacture is largely nullified in the supporting members if not sufficiently accurate to derive all of the benefits of closer limits and extreme accuracy in the anti-friction units themselves.

Very careful grinding operations are used to finish these carriers in the most up-to-date shops. In place of the reaming operation formerly employed at the Hudson and Essex plants, for instance, the bore for the pinion bearing case is internally ground on a Heald grinder. Very close tolerances are held on the grinding operations at this point, a limit of plus one-half thousandth and minus one thousandth being rigidly adhered to.

With this sort of accuracy, it is easy to see that longer bearing life may be obtained for a greater length of time. It would be possible to go through the

entire car, step by step, speaking of better methods of finishing parts for accuracy and, consequently, for longer life and easier maintenance, the honing of cylinder bores, more accurate grinding of pistons, more accurate machining of crankshaft, closer limits on clutch spline, closer limits in universal joint manufacture, more accurate workmanship on axle and steering gear parts, with a consequent gain in interchangeability which makes it a simple matter for the maintenance men to take out a worn piece and substitute a new one, and also with a gain in life and durability which makes the car economical to repair. This reduces the fear of the maintenance man, which must be confessed was instilled in the minds of many of the earlier car owners and many of those who bought their cars not so long ago.

Lighter Reciprocating Parts Much in Evidence

Rapid Gains Being Made By Aluminum Alloy Piston. Tendency is to Make Connecting Rods Very Long. Alignment of Pistons and Rods In Cylinders Receiving Much Attention

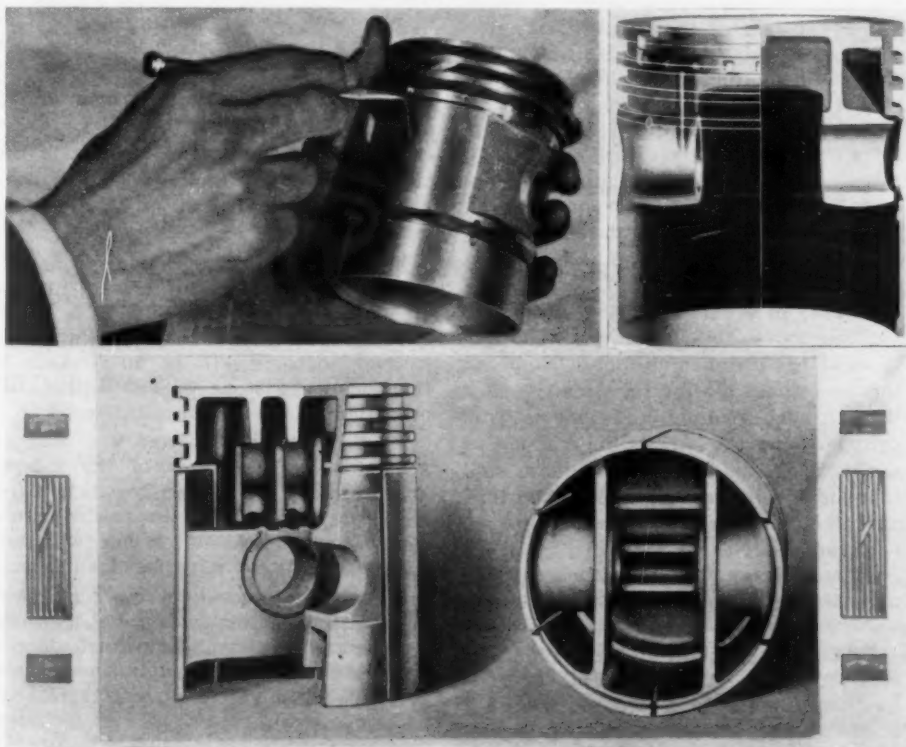
THE modern engine used for motor cars, and this applies in many ways to truck engines, too, is replete with refinements and constructions which seem to be a putting into effect much of the valuable data gained in the last few years in laboratory and road tests. The experience which our designers had with aircraft engines has had its effect upon certain phases of motor car engine design, although this necessarily must be modified to suit the different conditions.

We have today much more efficient engines even with the same number of cylinders, bore and stroke. Engines have become smaller but we have much more efficiency from our cars. Putting into practice those theories which have proved their worth during the past few years, better production methods, closer inspections and more attention to maintenance matters have joined hands in helping the makers turn out units which, generally speaking, are as perfect as man and machine can make them.

Today we are doing many of the things which a few years ago it was agreed for the most part could not be done. Take the case of the aluminum alloy piston. It is making good in many of our most efficient engines. The constant clearance type of alloy piston, especially, seems to be coming to the front rapidly.

This type of piston usually is made with a cut of some kind in the skirt so that when expansion takes place the cut simply closes and does not, therefore, change the outside diameter of the piston. Thus, we cannot think of this type of piston as expanding in the same way as we do of an iron piston.

The constant clearance piston is generally made with an opening extending circumferentially around the piston, ex-



Some typical examples of modern pistons. The upper left view is that of a Cole constant clearance type of aluminum alloy piston. Upper right, the new Thermolite piston, a combination aluminum alloy and cast iron piston. The lower view shows the Long piston, as used in the Franklin engine

cepting for a small portion where the piston pin bosses are located. This is done to separate the upper, or heat portion of the piston, from the lower or slipper portion of the skirt.

The gray iron or semi-steel pistons still are used by the majority of makers and in most cases these are being made very light. The fact is that some of the cast iron pistons hardly weigh any

more than an aluminum piston. Some of the lightweight iron pistons can be grasped in the hand and squeezed into an oval shape. This is of importance as will readily be seen by the fact that such a piston will more or less adapt itself to the bore in which it is working.

Then there is the composite type of piston which lately has made its appearance, although a piston of this type is

not entirely new to the industry, having been used by such concerns as Marmon. The latest development along this line is the Thermolite piston in which the central part of the head, bosses, and the ribbing extending between the two are made of aluminum alloy. The cast iron part acts merely as a guide and sealing element, all the thrust of the explosion being taken on the aluminum element.

Long life is claimed for these pistons because the wearing surfaces are cast iron and thermal advantages are claimed in that the heat conductivity of the aluminum alloy is three times as great as that of cast iron. These pistons weigh, it is stated, from 25 to 40 per cent less than an iron piston.

Because the iron does not carry any of the actual driving stresses, the wall can be made as thin as 3-64 in. Provision is made for the difference in the coefficient of expansion in the iron and aluminum so that no undesirable stresses occur. Nor is the explosion pressure transferred to the locking device which holds the two elements.

The lock consists of a drawn steel collar with webs to increase its strength and also to receive a spanner wrench. The lower face of the collar has twelve cam faces which engage twelve similar cam faces on the iron skirt. These are locked and pinned.

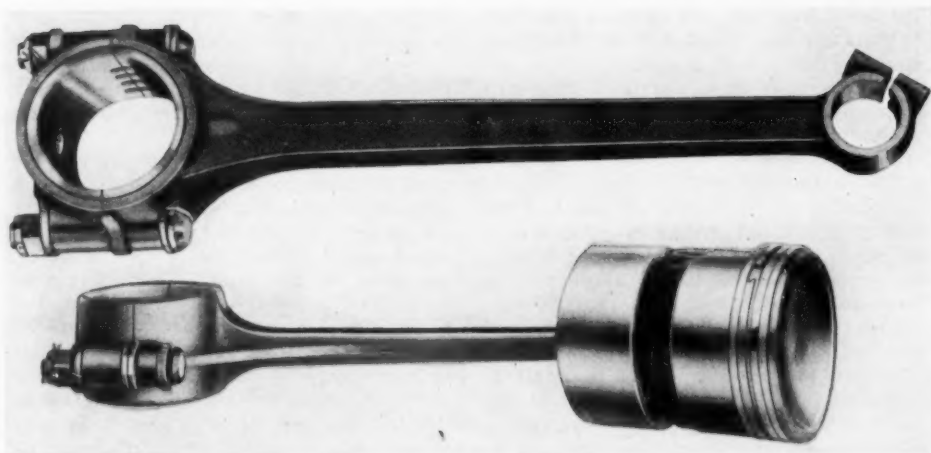
Coming to the semi-steel piston, one of the things in its favor is that it can be machined to closer limits than the cast iron piston. This also makes for a reduction in weight, a desirable feature.

Pistons Quite Long

A study of the pistons used in the new engines shows that there is a tendency to make the pistons quite long. No doubt this is responsible for the greatly added life of such pistons and also of the cylinder bores. A long piston will not so easily cock in the cylinder bore and there is a better distribution of the load on the cylinder walls, because the wear is taken on a larger area. This, with a good oil film and the better grade of material used make an engine longer lived.

Ribbing the inside of the piston has received much attention. This is done to distribute the load imposed upon the head of the piston by the explosion pressure and also to radiate heat through the piston and into the crankcase. When the ribbing extends over the piston pin bosses, we have the cross-head type of piston of which the Essex, Cole, Maxwell and Franklin are examples.

In the Cole piston, which is a good example of the constant clearance type, we have a molded in metal alloy piston slotted circumferentially below the lowest of the three piston pins. The slot is cut by a saw and extends over an arc of 83 deg. on each of the two pressure sides. By means of central ribs the load due to the gas pressure is trans-



Typical examples of connecting rods showing the modern tendency towards long rods. The upper rod is that of the Lycoming engine and is of the "spade type." The piston and rod assembly at the bottom is that of the R & V Knight

ferred directly from the piston head to the bosses. The pistons fit the cylinders snugly even when cold and there is therefore, no undue noise when starting up.

Makers are giving much more attention to the proper alignment of pistons and rods in the cylinders in the belief that piston wear, oil-pumping and failure of the piston rings is due largely to misalignment. With a cocked piston one side of it becomes a scraper giving unequal lubrication on the walls. In the case of the Essex piston the slot in the skirt is cut at an angle so that it does not work vertically, but with a sliding motion.

In the Rickenbacker engine if a connecting rod is found to be bent, instead of its being bent to shape it is faced off on a special fixture by grinding. This is done so there will be no stresses in the rod when it is heated during the operation of the engine.

Most of the engine and car makers are polishing the heads of the pistons and while this is expensive it has the advantage of keeping the engine much cleaner, inasmuch as carbon will not adhere readily to a polished surface.

Much development work has been done on connecting rods to make them lighter and stronger. The finish on the rods is much better and in some cases they are machined all over, as is customary with the rods in an aviation engine.

Connecting Rod Design

And the rods are much better balanced than formerly. In the old days if a set of rods all weighed within a half ounce or so of each other they were passed. But now, nearly every engine maker balances the rotating ends of the rods and the reciprocating ends separately.

Connecting rods with flared big ends are common. Frequently such rods are referred to as the spade type. This makes for a better distribution of the load on the connecting rod bearings because the load taken by the bearing is

spread over a greater area. The connecting rod in the new Lycoming engine is a good example of this. Incidentally this illustrates the marked tendency to make the connecting rods extremely long, which with a small bore in the cylinder naturally reduces side thrust owing to less angularity of such rods.

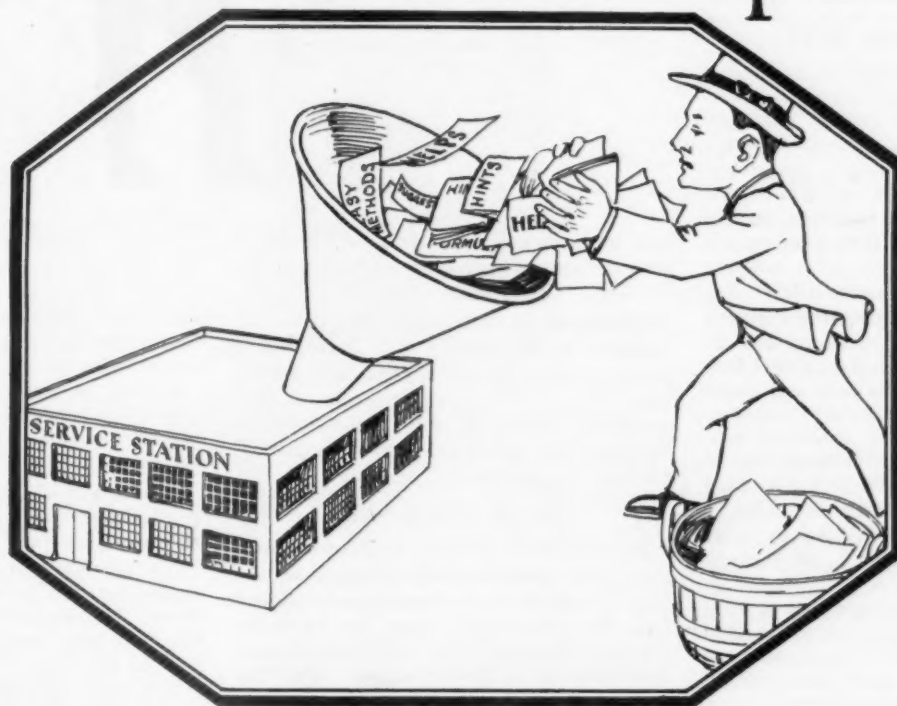
Forged Aluminum Rod Novel

A recent development, which likely was an outgrowth of the aluminum alloy piston, is the forged aluminum connecting rod. The chief advantages of such a rod, according to the Aluminum Manufacturers, Inc., when used in a high speed internal combustion engine, lies in the fact that the chief cause of bearing wear and failure is the loading imposed upon the crankshaft and connecting rod bearings from the inertia of the moving parts. With a forged aluminum rod it is possible to reduce the lengths of the bearings, which in turn makes the whole engine lighter.

Also it is stated that the same stiffness can be obtained from an aluminum rod for about one-half the weight of the material required in a steel rod. This is important because the chief difficulty in rod design is getting plenty of support to the babbitt bearing metal without increasing the weight of the rod to too great an extent. The aluminum rod, especially when used in conjunction with an aluminum piston, is said to materially lessen the whipping action of a crankshaft often caused by too heavy pistons and rods.

At this point mention might be made of the honing process for finishing cylinder bores. This method is said to give better wear resisting qualities. Two well known makers, Oakland and Buick, use this process of finishing the cylinders. The tool used for this purpose is somewhat similar to an inserted blade reamer except that carborundum stones are used in place of the blade. These stones grind the walls of the cylinders to a period of several weeks.

Maintenance Facilitated by Manufacturers' Co-operation



A More Liberal Attitude Toward the Other Fellow is Being Seen in the Automotive Field. Manufacturers Are Doing All in Their Power to Render Assistance to Dealers. Better Tools, Better Methods of Keeping Parts, Better Business Methods, All Combine to Bring Confidence and Success to This Enormous Industry

TIME was when the attitude of the makers of motor cars was something to the effect that the product was perfect. Everything had been properly designed and built and nothing could possibly go wrong. If the evidence of breakage or trouble was brought to their attention, it wasn't so anyway.

This point of view gradually gave way to the more practical one that a motor car was a well built piece of machinery that required a certain amount of care, and possibly might need repairing at some distant date. The contention was made however, that in the event that work on the car was required, that there were authorized representatives, dealers, or factory branches where the work should be taken. Any other shops that attempted to violate the sacred precincts of the car's internals, were referred to as tampering with the mechanism, and any and all ills were blamed on such tampering.

In the above point of view the makers

of motor cars were reckoning without the human element or personal preferences of the car owner, who most unreasonably, would find occasion to take his car to some repair shop, where he happened to know the man on the job. In many cases the mechanic in question might do the work properly, but in many instances this was not the case, so that the work would be imperfectly done, and the user of the car would be correspondingly disgruntled.

Consideration for the Independent Garage

Then the factory would figure that it served the owner right for not patronizing an authorized service station, and again the car owner would manifest his right to his own viewpoint by holding a poor opinion of the car in question, even in circumstances where it may have been due to no fault in the car's construction.

In the above analysis it is possible that

the factory may have been right, but when the owner's lack of technical wisdom produced a dissatisfied condition that resulted in knocking that particular car, the factories woke up to the fact that right or wrong, the owner must be supplied with good service facilities at any cost.

Factory service policies now are taking into consideration the fact that the better class of independent maintenance shops can act as valuable adjuncts to the regular channels through which parts and service flow. One illustration is in the matter of discounts, which more and more are enabling the smaller shops in the outlying districts to make a profit without boosting the sale price of parts to the car owner.

The dissemination of information is now also receiving attention from the factories, as it is realized that failure of the small shops in doing a good job may in many cases be due to lack of information.

One way in which the desire for co-operation is seen is in the instruction books that are prepared covering the different models put out by the various manufacturers. In this regard it is interesting to compare the books of today with those of a few years ago, where the chief contents referred to methods of moving the gear shift lever, filling the gas tank and similar items which are now a matter of common knowledge even among laymen.

Better Instruction Books

In comparison with these older books it is interesting to study the newer ones where, for example a cut of the carburetor will be shown, giving the internal construction. Then a detail explanation will be given of where the gasoline goes and why, and how to adjust the carburetor at various points for best operation.

More illustrations are now being used, as for example in reference to the clutch or rear axle, where the details will be given and explicit instructions included so that a man with mechanical sense can handle the job. The electrical system is also explained in a general way, although more explicit information in this regard would not come amiss, and the wiring diagrams given show in many cases, not only the diagram but in many cases the actual appearance of the various instruments and wires, located in the same way relatively that they are on the car. Even the timing of the valves is in many cases carefully explained, so that the maintenance man may rebuild the engine according to the factory specifications.

A Good Instruction Book May Prove a Life Saver

These books, explaining the construction and adjustments of those parts of the car on which work is most commonly done, fill a two fold need. First they supply the independent garage and even the authorized service station with information that they can use to advantage.

The second use is for the owner that



has some mechanical sense and may get into difficulties when far from the haunts of man. Under these circumstances an explanation of the adjustable cam, for example, in the ignition distributor, might prove a veritable life saver, while a slipping cam, with no explanation of this possible adjustment, would cause inconvenience out of all proportion to the extent of the mechanical trouble.

Service Bulletins

Investigation would doubtless show that poor work at high prices has not been confined to the independent shops, and that assistance from the factories can well be used by the authorized stations as well as by the others. For this reason the instruction books are often supplemented by instruction sheets, bulletins, or service manuals, which go out to the regular authorized service stations.

These will give information for the maintenance division that may outline the method of fitting bearings, which by extensive investigation has been found to be most satisfactory. In other cases a new type of piston may be explained, and the necessary clearances given, so that a rebuilt job may be handled with

as much precision as if it were sent to the factory.

More and more it is being recognized that the maintenance shop should be able to tell the car owner the cost of the job at the time the car is brought in, for the car user is rarely willing to have the job done when he has no idea as to whether it will cost him twenty dollars or a hundred and twenty.

Practically all service station managers realize this fact but due to lack of quantity work on jobs of any one kind, they have not enough data from which to make out flat rates for various operations. If rates are set from a few isolated jobs, they may be too high, and result in driving work to a competitor, or if too low will result in a loss of money to the shop that handles the job.

Factory Production Has a Lesson for the Dealer

It is at this point that the factory can cooperate to greatest advantage, for from its manufacturing experience, data can be taken which can be made applicable to the service department of the dealers' establishment. Allowance must of course be made for the fact that one job at a time is being handled in the service work, while in production the work goes through in large quantities.

On this basis, time allowances can be figured out for various operations, and this information can be used by service stations in making the prices which are quoted to the car owner. In many cases the factory production methods teach a lesson that can be profitably imitated by the dealer.

One example is the use of the arbor press for putting a bearing on a shaft. With the proper equipment the bearing can be put on, not only more quickly and easily, but without cramping it on the shaft in such a way as to affect its alignment. With the old fashioned method of using a hammer for putting the bearing on, the inner race was usually cramped this way and that as the hammer was used on first one side and then the other.

Tools and Equipment

Successful operation of the flat rate system depends for its profitable applica-



tion on the use of up to date tools and equipment. Many dealers, however, even when willing to install the necessary equipment are handicapped by lack of knowledge as to the sort of equipment, that can really be considered dependable. Here, too, the factories are coming to the rescue, and are testing out various maintenance equipment and recommending it for service work on their cars.

Connecting rod bending bar.

Radiator Repair Unit

Radiator test tank.
Radiator repair torch.

Special Tool Unit

Time savers—gear and wheel pullers, and numerous special purpose tools.
Cylinder honing outfits.
Main bearing aligning or boring bars.

Valve seat refacing tool.

Socket wrenches.

1-ton hoist.

Rocker arm lever.

The impartial attitude of the Oakland company and the Hinckley-Myers company in compiling the list of approved tools is shown in the fact that quite a number of the devices in question, while listed in the Hinckley-Myers catalog are products of other companies. For example the Black and Decker electric valve grinder and electric drill, the Franklin Universal Valve and Cutter Grinder, the Chisholm-Moore Mfg. Co., chain hoist and the Kent-Moore line of reamers are recommended as reliable equipment.

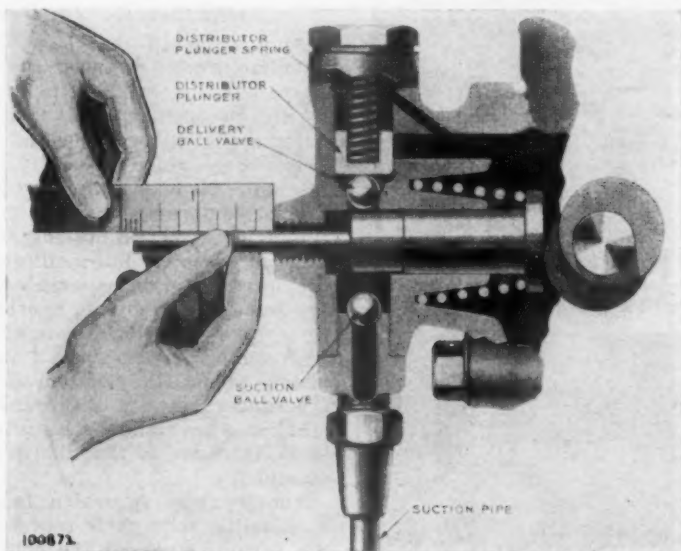
The Repair Tool Chart

Another way in which cooperation is being given to the dealer, is in the preparation of repair tool instruction charts, which show the chassis of the car in question, together with arrows pointing to the various parts. Then when the mechanic in the shop has occasion to work on the springs, for example, he refers to the chart, and finds the arrow that connects with a number, indicating the tool required. Having the tool number, he proceeds to get and use the proper tool for the job.

In this way a great deal of time is saved on each job, the tools can be used to greatest advantage, with the resulting reduction in cost and corresponding increase in profits on the job. A reproduction of such a chart as supplied for use in Chevrolet maintenance stations is shown in Fig. 1.

A feature of instructions supplied by the car maker and the maker of service station tools is a chart of the floor plan that is supplied so that the various tools may be suitably located. In the booklet previously mentioned, two such plans are incorporated, one being applicable to large service stations, where the maximum number of tools are needed, while the other plan is intended for medium sized stations where some of the more specialized tools can be dispensed with.

In the matter of small tools, socket



The modern instruction book shows in detail how adjustments should be made

One instance of this kind is seen in the action of the Oakland Motor Car Co. For some time it had been their custom to develop tools for service work on Oakland cars, but realizing that the building of tools is a specialty, they have changed the plan somewhat by working in conjunction with the Hinckley-Meyers Co., of Jackson, Michigan. This concern specializes in garage and service station equipment, and many of their devices have been tried out and approved by the Oakland company. The results of this investigation have been incorporated in a book of recommended tools, among which might be mentioned the following:

Emergency Unit

Portable wrecking truck.

Machine Unit

Arbor press—20 ton.
Electric drill.

Bench Fixture Unit

Straightening press.
Ring gear aligning device.
Bench arbor press.
Surface plate.
Brake band riveting machine.
Piston vise.

Floor Tool Unit

Axle stand.
Engine stand.
Wash tank.
Car trestles.
Car jacks.

Miscellaneous Units

Motor lifting fixture.
Car lifting hooks.
Front wheel tramping device.
Axle straightening bar.

Cam shaft bearing line reamers.
Piston ring groove deepening tool.
Center main bearing facing tool.
Connecting rod and piston aligner.
Cylinder head holding fixture (with valve spring compressor.)
Transmission stand.
Crank pin returning tool.
Grinding and milling machine.
Cylinder testing gage.
Electric valve grinder.
Bench grinder.
Electric valve refacer.
Garage jack.
Portable work bench.
Floor crane.
Reamers—complete set.





**The Walker
MICROGAGE**
(PATENTED)



Price
\$35.00
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WHAT A MICROGAGE DIAL SHOWS

The Microgage dial hand will instantly and automatically indicate the slightest deviation in cylindrical bores—either plus or minus—from any given standard, and the dial face is always in plain view of the user, no matter in what position the Microgage may be operated within a cylinder. There are no adjustments or calculations to make and the Microgage requires no "hand" manipulation.

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Walker Microgages completely eliminate the uncertainties of human judgment and the necessity of practical experience, so essential to the skillful use of the old style inside micrometers. There is never a doubt as to the correctness of a Microgage reading. In the hands of one or ten thousand men the result will be always the same—because a Microgage is mechanically automatic. It does not depend upon the questionable accuracy of the human touch, or the state of the operator's nerves. In use, the Microgage is simply inserted in a cylinder bore and moved up and down its full length. It is also turned spirally, or completely rotated at as many points as may be desired. It has been repeatedly proven, that, one man with a Walker Microgage will accomplish more work than three experts using inside micrometers.



The above illustration shows the Microgage being used from the top of the block. However, an accurate reading can also be obtained through the under side of the motor while it is still in the car and thereby not making it necessary to remove cylinder head.

Microgage has been thoroughly tested and proved by the Oakland Motor Car Co., and is recommended as essential for all Oakland Dealers.

The Walker Microgage Company
2-146 General Motors Building
DETROIT, MICH.



Page thirty-six

Cooperation with the dealer is shown when a motor car maker and a tool concern combine and show in their catalogue tools made by a third concern

wrenches and similar items it is interesting to note that Walden-Worcester of Worcester, Mass., can supply lists of wrenches for the various cars. These are available both for the car user and the service station. The owner's kit would of course include open end wrenches suitable for the various nuts on the car, while the service station assortment would take in the speeders designed for rapid work.

For Reconditioning Cylinders

The cooperation of motor car factories in investigating means of reconditioning cylinders is illustrated in the action of the Nash and Chevrolet factories in testing and recommending the Red Devil cylinder lapping tool, put out by the Midwest Engineering Co., of Minneapolis. This device has a number of expanding members which maintain a parallel posi-

tion as they expand. The device is driven by any means that may be convenient, as for example with a portable electric drill.

It is intended to be used with a special compound which wears the cylinder walls about .002" and then loses its abrasive quality, so that if by chance any of the compound should be left in the cylinder it would cause no harm. Lapping the cylinder out more than .002" is accomplished by feeding new supplies of the grinding mixture into the tool, where suitable ducts feed it to the grinding surfaces.

Even in the original building of the car, the point of view of the maintenance department is being felt. For example it is a simple matter to put a few extra holes in the frame side member, before the frame is assembled, for they can either be punched or put in with a multiple spindle drill.

If additional holes are needed in the service station, however, it is a case of get under, and work the electric drill, the work usually being made more difficult by the presence of wheels and fenders. Most cars sold are being equipped with bumpers, and it is for the purpose of attaching devices of this nature that the frames at the factory are being provided with the necessary attaching holes.

Field Service to Dealers

Another detail that has received the manufacturer's attention is a slight change in the cylinder to facilitate inserting the pistons. This is a long gradual chamfer at the lower end of the cylinder bore, which makes it possible to insert the pistons, without using a special tool to compress the rings.

Such construction not only helps in the original assembly but facilitates work at the service station as well, especially in the case of a complete overhaul, where the engine is in place on an engine stand and can be turned so that insertion of pistons from the bottom is feasible. Clearances between the crankshaft and crankcase have also been made sufficient in many cases, so that this procedure is possible.

Another way in which factories are cooperating with their representative in the various parts of the country, is in the use of field men traveling to the different dealers and maintaining a personal touch, at the same time keeping the dealers posted as to the latest practice in maintenance methods.

For example if a certain car suddenly experiences an epidemic of trouble of some sort in one part of the country only, it is quite likely that it is due to the dealers in that territory being uninformed as to certain service practice. A field representative from the factory under these circumstances can get to the bottom of the trouble, and usually prevent conditions from becoming serious, and affecting the sale of cars in that particular territory.

Field Representative Acts as General Business Adviser

In many cases the field representative acts as a general business adviser. He may present a plan of flat rate charges and superintend its installation, working with the dealer until the idea is grasped, and the method is put into operation.

In other cases he may find that the dealers' success is hampered by the way in which parts are kept and under these circumstances he may sell the dealer on the idea of equipping with approved type of metal shelving; then when the change is made he may superintend the installation of the shelving, and get the stock man started on the right track.

Another way in which the motor car maker cooperates with the dealer is in the treating of parts shipped out so as to prevent rusting, as they stand on the shelves. Deterioration of parts in stock due to rusting can eat into the profits to a considerable extent, and if parts are not treated at the factory, this detail at the dealers stock room may be overlooked.



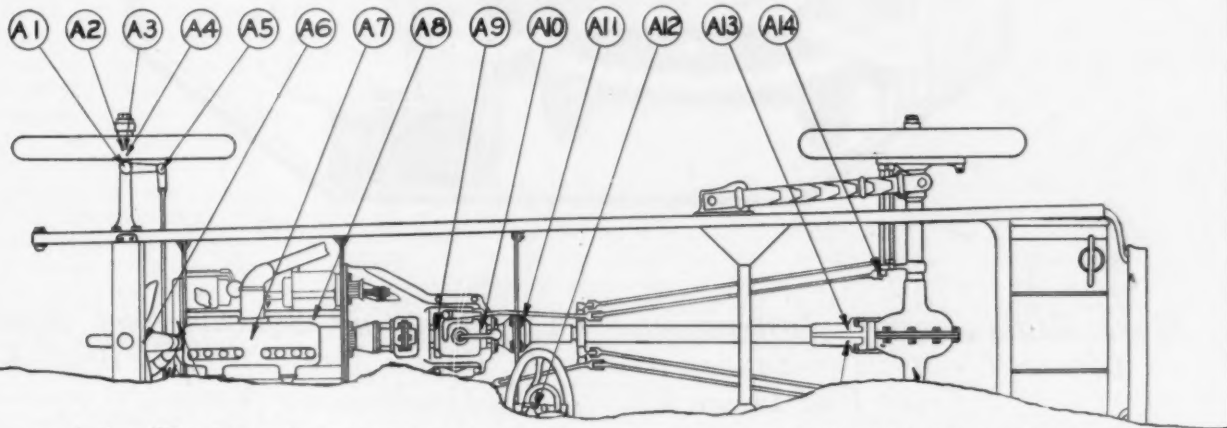
CHEVROLET



Repair Tool Instruction Chart for All Models

- A1** HM-123—Spindle Body Bushing Remover and Replacer. This tool is for use in removing and replacing the spindle body bushing from the Chevrolet "490" front wheel spindles. The tool consists of two parts, the wedge pointed driving arbor and the split expanding fork. For removing the bushing, the fork is inserted inside the spindle with the end which is not split projecting out through the bushing. The driving arbor is then inserted through the other bushing hole and the wedge point enters the split end of the fork, expanding it out against the wall so that the fork will catch on the bushing and cannot slip through. The bushing can then be either forced out by pounding the arbor or under the arbor press. To insert, the bushing is placed on the driving arbor and the bushing can then be easily pressed or driven into place.
- A2** HM-47—Stationary Cone Driver for Front Wheel Spindle and Timing Gear. This tool drives stationary cone on the front wheel spindle of the Chevrolet cars and will also drive on the timing gear on the end of the crank shaft.
- A3** HM-124 C and D—Chevrolet "490" and "FB" Ball Race Drivers. These tools when used with A-9 combination handle and Chevrolet bushing driver are for driving or pressing in the ball races in the models "490" and "FB" Chevrolet.
- A4** Front Wheel Outer Ball Race Extractor for Chevrolet "490" and "FB." These adapters consist of one puller for the "FB" outer race and one part for the "490" outer race. They are used by dropping a pair into the ball race and then expanding out so that the head projects into the ball bearing retaining ring groove. The expanding and pulling is done by using HM-120 universal bushing puller.
- A5** HM-55—Steering Arm Bushing Removing and Replacing Press. This tool will press the bushing from the steering arm or plain arm on the Chevrolet "490" and it will also press in a new bushing. It is thus unnecessary to remove the arm from the spindle when rebushing this part, and it makes a hard job easy.
- A6** HM-125—Combination Fan Adjusting Spanner Wrench for Chevrolet "490" and "FB."
- A7** HM-126—Combination Oil Trough Depth Gauges for "490" and "FB." The "F" shaped gauge is for adjusting the height of the false bottom in the crank case pan, while the "U" shaped gauge is for determining the length of the spoons on the bottom of the connecting rods when the connecting rod is at its lowest position, and the ends of the gauge are placed up against the bottom of the cylinder block casting.
- A8** HM-128—Chevrolet Connecting Rod Aligning and Bearing Fitting Arbors (Set of 2 for "490" and "FB"). These arbors are accurately ground to the size of the crank pin bearing. The flattened end should be held in a vise and the arbors run thus be used for scraping connecting rod bearings, to a good bearing surface, and by holding the square on the arbor and having the piston on the connecting rod, it is possible to check the connecting rod for being bent and making the piston out of line.
- A9** HM-124C—Chevrolet Transmission Bushing Driver. This tool is for driving or pressing in some of the bushings in the Chevrolet Transmission.
- A10** HM-124—Bushings Tool Handle and Chevrolet Transmission Bushing Driver.
- A11** HM-122—Combination Universal Joint Puller. This tool will pull the universal joint of the Chevrolet models "490" and "FB." It is used by removing the cap and taking out the "T" shaped shaft. The cap is then put back on and the fingers are inserted in the space formerly occupied by the shaft. The handle is then tightened and the joint will be pulled off. By reversing the fingers on this puller so that they turn in instead of out, it can be used in many places where a puller with three or four fingers would not fit.
- A12** HM-119—Chevrolet "490" and "FB" Steering Wheel Puller.
- A13** 6-M—Tool for Driving Axle Shaft Gear and Propeller Shaft Hyatt Bearing Sleeve. This tool is used with the driving handle A9—HM-124.
- A14** HM-136—Brake Operating Cam Lever Remover for Chevrolet "490" and "FB." This puller is for removing the brake operating cam lever from the end of its shaft. The tapered pin, which is driven through the shaft, should first be driven out. The set screws are then tightened in the holes thus left, and the lever can easily be pulled off. NOTE: There is a Woodruff key in this shaft so that you cannot drive the shaft through the housing but must pull off lever.

ABOVE TOOLS ARE FOUND IN CHEVROLET TIMESAVER TOOL BOX "A"



A chart like this in the maintenance shop enables the mechanic to pick the right tools for the job

Thermostatic Control Popular in Cooling Systems

MUCH has been going on in the last year or so toward improving the water passages in cylinder blocks, and thereby insuring such blocks against the danger of warpage when the engine is put into use.

In water-cooled engines we still have the two basic systems; that is, the pump and thermo syphon systems. About two-thirds of the water-cooled cars use the pump system. Air cooling of the cylinders, of course, is still in evidence on a few makes of cars and the most recent addition to this school of design is the Chevrolet Copper Cooled Car.

Examination of the makes of cars using thermo syphon cooling shows that in the main the lower priced cars employ this system, while the higher priced cars use the pump. There are exceptions to this, however, Wills Ste Claire, for example, using the thermo syphon system.

Both systems, of course, have their advantages and disadvantages. The pump cooling system has in its favor the fact

that less water is used in the system. The radiator can, consequently, be smaller, and in spite of the added weight of the pump and pump drive parts, the final result is probably a lighter system. On the other hand, thermo syphon has its advantage in simplicity and practically attains in an automatic manner what is obtained by using a thermostat.

As a result, we find thermostatic control of the water temperature coming rapidly to the front. One of the accessories which was displayed at the time of the New York show and which seems to have considerable merit is the Aquastat, a small device which is inserted in the hose connecting the cylinder block to the inlet pipe of the radiator.

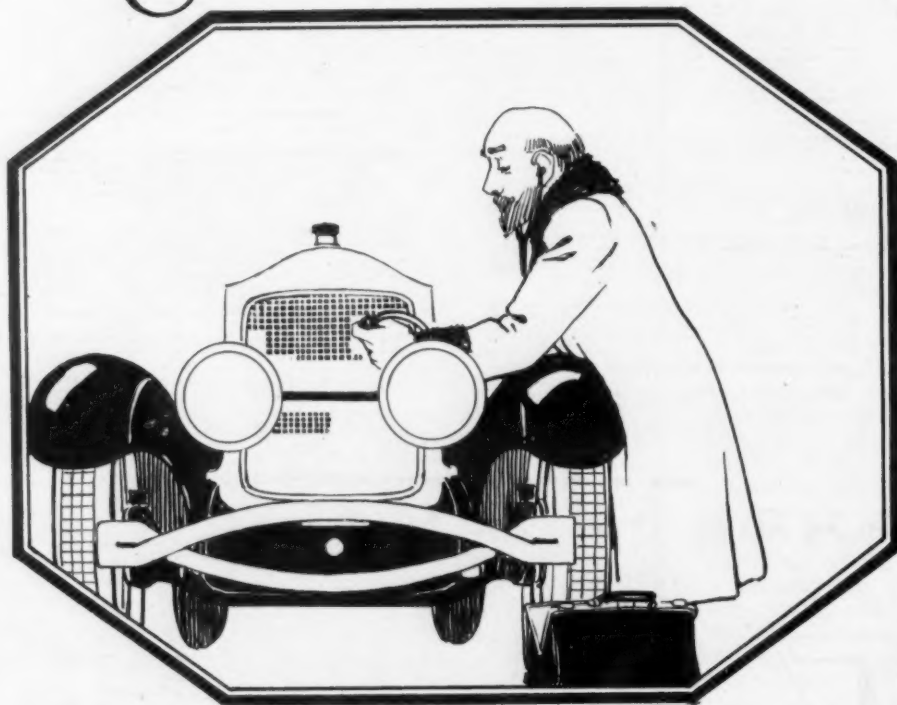
This device is so built that when the engine is cold the passages in it are closed and only the water in the jackets will become heated upon the engine being started. As soon as this water reaches a pre-determined temperature, the Aquastat acts and gradually the water passages are open and cooling is

effected in the normal way by the water passing through the entire system.

No doubt one of the reasons there is practically little or no difficulty in the cooling systems of our engines today is due to the fact that much development work has been done in cylinder blocks in the way of directing the water in such a way that it is brought into contact first with the hottest portions of the engine. The new F-50 Mitchell engine is a good example of this. Here the relatively cool water passes over the exhaust valve first and then is directed through the block in such a way that the entire block is uniformly cool.

This also has a direct effect upon preventing exhaust valve warpage. The Oldsmobile 8-cylinder block is novel in the way of cooling. In this block there are three holes in the water inlet manifold which evenly distributes the water between these cylinders instead of all of the water emerging at the end of a manifold and passing progressively from one end of the block to the other.

Curing Chassis Noise



*More Rigid Frames Instrumental In Eliminating Squeaks and Rattles.
Liberal Use of Anti-Squeak Material. Bodies More Strongly Braced
Front End Drive Effective In Overcoming Noise*

SQUEAKS and rattles, bane of the good disposition of many a service manager and maintenance men in general, have been dealt a severe blow in the newer models.

Much has been accomplished during the last few years in the quieting of the chassis. It was rather common in the past to have a comparatively new car set up a variety of rattles and other objectional noises after it had been driven but a short time and while this state of affairs has not been altogether eliminated from present day cars, much good work has been done by the co-

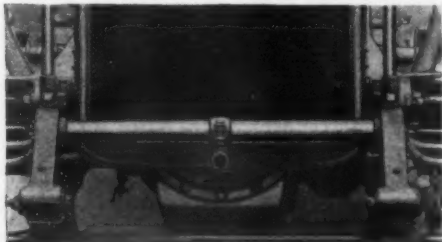
operation of chassis builders and body builders.

The chief difficulty in the past was that frames of chassis were very often too light and not sufficiently cross-braced to prevent weaving. This naturally had its influence upon the body, because it is a physical impossibility to have a body structure remain quiet and intact upon a frame which twists and weaves with spring action. Depth of the side rails is not the answer to a more rigid frame, because if the frame is not properly braced by cross bars and tubes it will weave just the same.

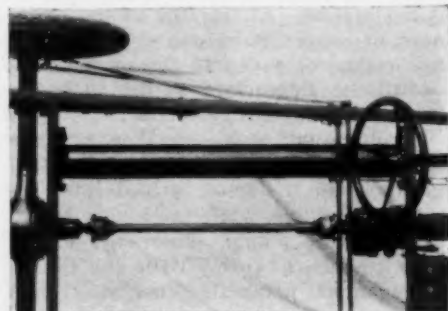
One of the more recent examples of a sturdy frame is that used in the Barley. This car has a wheelbase of 118 in. yet the frame has a depth of 8 in. The webs on the side rails are 2 in. wide and the stock used is $\frac{1}{4}$ in. in thickness. Integral gussets are used for anchoring the cross members and there is a box section cross member at the center which adds considerable stiffness to the frame. In addition there is a heavy tubular cross member at the rear against which the side rails are drawn by a through bolt.

While there has been a tendency to make the side rails deeper, there are cases where the side rails have been kept substantially the same depth as before, but the flanges or webs have been made wider.

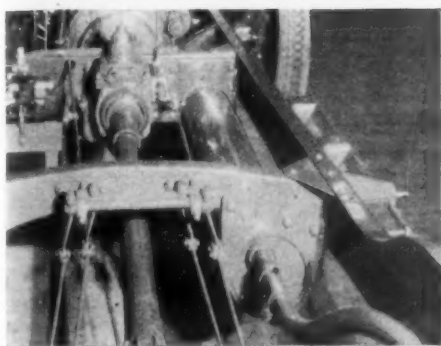
Another point which has received considerable attention in the prevention of frame weave is the proper location of tubular cross members, especially in the small cars, at points where the frame torsion due to the action of the rear springs is greatest. A notable ex-



Typical installation of tubular cross bar at front end of frame. This is on the new H. C. S.



On the Star and Durant cars the Muffler acts also as a frame stiffener. It is flange mounted



This shows another view of the Durant method of stiffening the frame with the tubular muffler

ample of this is to be found in the Gray chassis.

From a structural standpoint the tubular cross member in this frame is the key to the entire frame. From the illustration it will be noted that the tubular cross member has been placed at a point where the torsion is greatest. A drop-forged, heat treated plate is riveted to both the tubular cross member and also to the frame. It takes both the driving thrust and twist, due to the fact that the front end of the rear springs are supported at this point. The angularity of the rear springs has been found to materially reduce side sway.

Another instance where side sway has been eliminated is found in Buick. Here it has been accomplished by making the forward end of the cantilever spring 14 in. longer than the rear. This is an increase in offset of 4 in. over the older models. It also has helped to lower the chassis about 3 in.

In two small cars, the Durant Four and Star, additional frame strength has been secured by making the muffler a part of the frame. The muffler in this case acts as a longitudinal brace being attached by flanges to two cross members. This is distinctly a case of where a unit serves two purposes.

Mounting Radiator Important

The mounting of radiators has been given more attention of late. Improper mounting of the radiator has caused some trouble in the past from the fact that, as the radiator distorted with frame weave, it very often caused undue movement of the hood and in time the hood became bad fitting. This condition often was aggravated by a general twisting of the body due to too light and improperly braced frame structure.

A frequent illustration of this was found in cases of where such cars were placed so that one front wheel was considerable higher than the other, under which condition the hood often crept several inches up on the side of the car thus raised. Naturally there is bound to be objectionable noise and rattle in parts like the radiator, hood and cowl when body weave and frame weave allow these units to become distorted.

One concern has overcome distortion

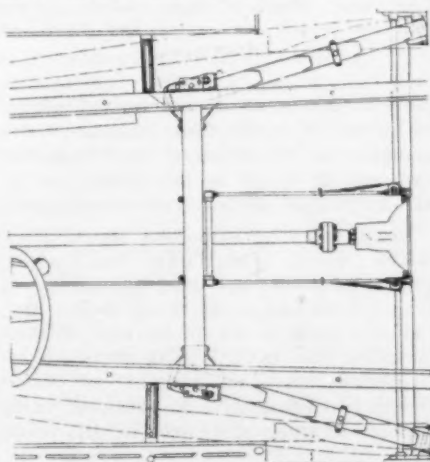
of the radiator by mounting the latter on balls, these balls resting in spherical seats. Thus, while the radiator always will be held securely to the frame, any misalignment is automatically taken up without any strain on the parts. It also helps to overcome any stresses induced during assembly of the car.

Much of the elimination of squeaks and rattles has been accomplished by placing anti-squeak material between all metal-to-metal surfaces and, of course, between the frame and body sills. One maker has successfully used buckskin as an anti-squeak material between body and chassis. With the use of heavier material for fenders, running board aprons and with the use of stiffer frames as mentioned before, many of the objectionable squeaks with which the maintenance man had to struggle have been largely overcome.

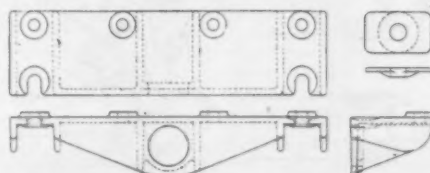
The elimination of squeaks and rattles takes in the body structure, too. In one of the popular makes of cars there has been a very generous use of malleable iron braces throughout the body and in many cases these braces are of sufficient overall dimension to extensively cover the wood frame work.

This is a practice to be recommended, because many of the squeaks difficult to locate have been caused by the glued mortise and tenon joints becoming loose and the joint working. One maker states that he has overcome all chance for the body framework to set up squeaks by painting the wood framework of the body before the metal panels are applied. The paint keeps all moisture out of the joint and insures it's always remaining tight.

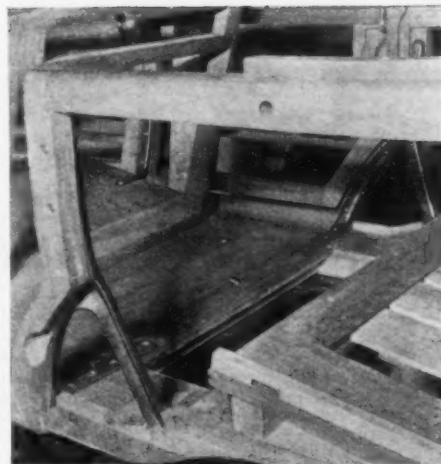
One of the prolific sources of squeaks and rattles has been in the spring



On the Gray car a tubular member is placed at the point where the rear springs are attached to the frame



The radiator of the Barley Six is mounted on spherical seats to prevent distortion



This shows the method of bracing the body woodwork with malleable brackets on the Buick

shackles, chiefly because these parts are necessarily small and subjected to very severe use. The shackles are in constant motion all the time and when it is realized that these parts have to support a great weight in addition and are not always lubricated efficiently, it readily will be appreciated why they wear and sooner or later rattle.

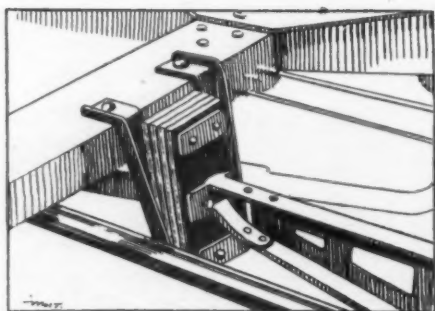
Some makers have been using anti-rattle shackles in the past, Jordan being a notable example. Some late recruits to this construction are Mercer and Peerless. In the Mercer the side links of the shackle are forged separately and are then machined with a taper hole in each end. The shackle bolts are necked at each end and the reduced diameters are threaded through a part of their length to receive nuts.

Adjustable Spring Shackles

The necked portions do not fit directly into the shackle links but split collars, tapered on their outer surface to fit the taper holes in the links, are interposed. Thin washers are placed between the nuts and the collars, after which the nuts are drawn tight. This forces the tapered collars into the tapered holes at the same time causing them to contract on the necked portions of the bolt, making a tight fit. The thin washers are then bent over in such a way as to lock the nuts securely.

The shoulders on the bolt space the links the desired distance, the latter being equal to the bushing pressed into the spring eye, so there is no side shake. Thus the bolts and links become, in effect, a single piece which is exceptionally rigid. The bolts are hollow and grooved to spread lubricant through an Alemite fitting. Peerless is using heavy spring shackles which are adjustable to compensate for wear. Among the other well known cars which have successfully used shackles with compensating features for wear are Hudson and Essex.

While there has been quite a general drift towards the adoption of Hotchkiss drive with the consequent elimination of the torque arm, those makers using a



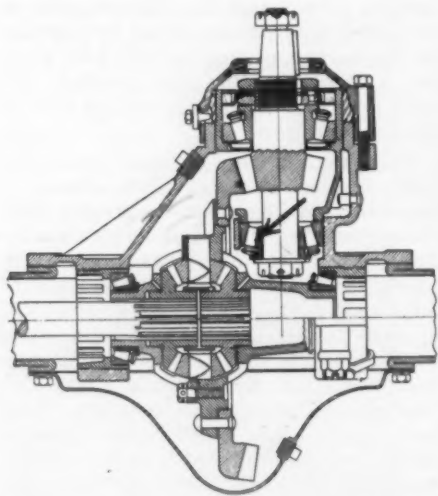
Peerless uses a fabric mounting at the forward end of the torque arm, which is silent and needs no adjustment

torque arm have done considerable work towards making the arm operate quietly after a period of use. The old type of front end mounting of the torque arm in which use was made of a two coiled springs operating in a housing filled with grease, with the ball end of the torque arm interposed, has given away to constructions which need no adjustment and which insure quietness.

Peerless Torque Arm Mounting

Peerless, for example, is using a fabric mounting on the forward end of the torque arm, while another concern mounts the arm on a flat spring bent into an oval shape, one end being attached to the arm and the other to a frame cross member.

Noisy rear axle gears are apparently a thing of the past, due to better manufacturing processes and insuring longer life to the parts by better design. From a construction point of view it would seem that the straddle mounted pinion shaft has much to recommend it. Several makers have adopted this. It has been used for some time in the Eaton axle. In its makeup, instead of the pinion shaft being mounted on two bearings placed in front of the pinion, there is a bearing on each side of the pinion. This construction is said to be of benefit



Straddle mounted pinion shafts are said to make for silence in the gears. This is in the Eaton axle. Arrow shows the rear bearing

in insuring that the gears will run much more quietly and on a true pitch line. The bearing in back of the pinion acts as a pilot to insure alignment.

Quieting the chassis takes in various features of the engine also. Heretofore the noise produced by overhead valve mechanism has received much criticism and in certain engines it was virtually impossible to keep the mechanism quite over any length of time. Frequent adjustment was necessary and lubrication was often difficult.

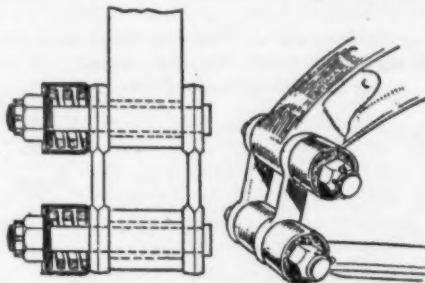
So far as quieting the valve mechanism in today's engine is concerned, much has been accomplished. Buick has seen fit to use a combination aluminum and steel push rod to compensate for variations in clearance caused by expansion of the parts under heat. Dord in its new six uses a pressure oiling system on the valve mechanism which insures oil to the rocker, push rod, tappet and camshaft. The entire valve mechanism



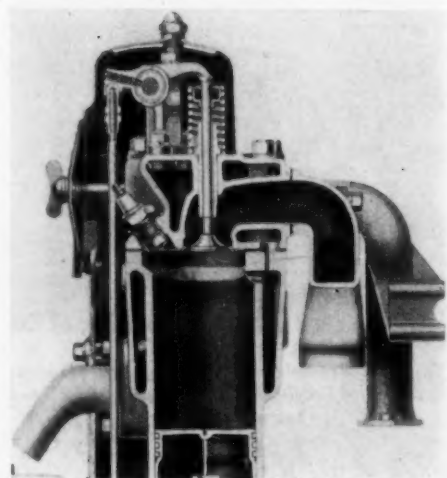
The new Handley uses fabric spring shackles which are quiet and need no adjustment

literally floats on a cushion of oil at all times. It is the first instance where a maker of a comparatively cheap car has seen fit to go to this length to insure quiet and efficient valve mechanism.

Many other makers now house their valves more completely and where aluminum covers are used for the valves in an I-head engine, as in the Buick, provision is made to oil the rockers without removing the cover. More detailed information on the subject of valve mechanism lubrication in overhead valve engines is given elsewhere in this issue.



The automatic spring shackle used on the Jordan, which compensates for wear

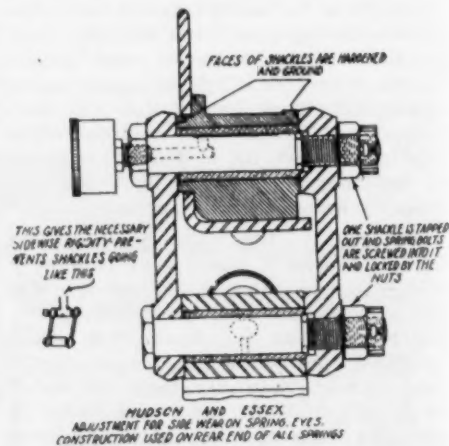


Buick has helped to silence valve action by providing ready means for oiling the rocker arms

About the only remaining objectionable noise, so far as the customer is concerned, which has been materially weeded out in the past year or so, is that caused by ill fitting timing gears. There has been a wide adoption of the silent chain for front end drive. Nearly one-quarter of all the models now produced use silent chain for driving the camshaft and engine accessories.

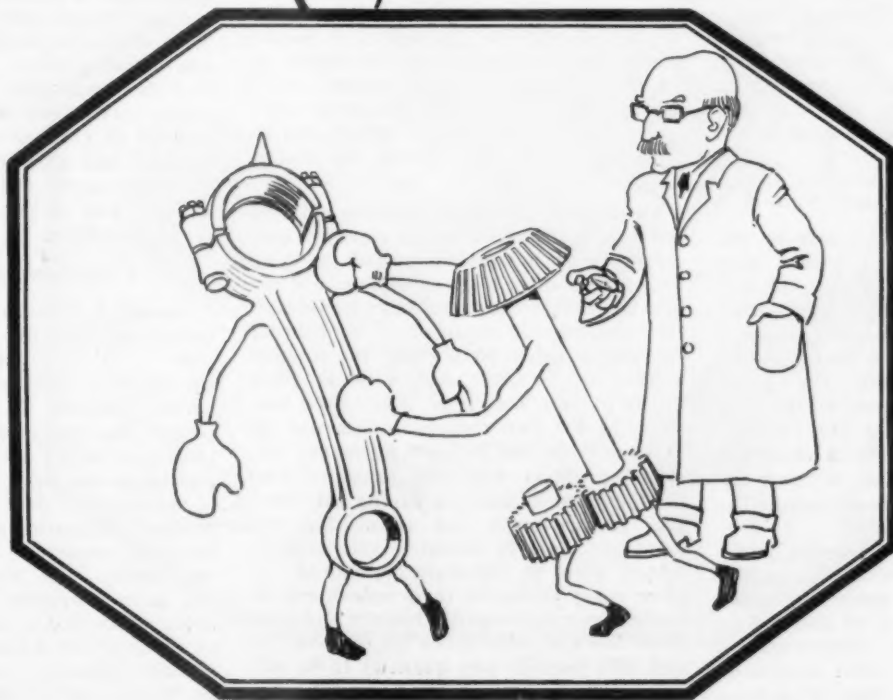
Heretofore chain drive has been popular only on the higher priced cars. Its use in lower priced cars is increasing as is exemplified in such recent additions to the field as the Star. The chain has a wide range of adaptability. Improvement in manufacturing methods has undoubtedly popularized chain drive, as it has resulted in production of a superior product at a considerably decreased cost.

Where timing gears are used for front end drive these, too, have been made more quiet by the introduction of one or two composition gears instead of steel gears for the total number used. Mitchell is an example of where the timing gears have been made to operate quietly by the introduction of two composition gears in the front end drive.



The Hudson shackle construction which is provided with an adjusting means for taking up wear

Spreading the Oil Film



Practically All Engines Now Use Pressure System of Oiling to All Main Points. Proportioning the Oil to Load Is Feature of Many Engines. Valve Stem Lubrication Given More Thought. Automatic Chassis Lubrication Coming to the Front

LUBRICATION by complete pressure system is still gaining ground, although there has not been any remarkable series of changeovers during the past season. The Maxwell engine is now more completely lubricated, this probably being the most typical example which would indicate the continuation of the trend. There have been a number of minor refinements in lubricating systems, however, which are noteworthy.

Oiling System Redesigned

During the year we have heard some criticisms from engineers on the full pressure system. The claim has been made frequently that the wear and tear on the oil, due to its being forced through the oiling system at pressures as high as 30 or more lbs. per square inch, tends to break down the body of the oil and destroy its lubricating qualities. Oiling systems have been redesigned to some extent, therefore, so that in a great many of the installations the entire quantity of oil is not forced through the system, but merely enough for lubrication, the remainder going through a by-pass valve and directly back to the reservoir in the crankcase.

In connection with the pressure feed lubricating systems in which the gear type pump is used, there have been some refinements in the construction of the pumps themselves, particularly in better workmanship on the gears and also more accessible installations, quite a few now being made so that withdrawing three or four cap screws is all that is necessary before removing the whole body of the pump for cleaning or inspection.

One of the precautions which must be taken in connection with the full pressure oiling system is that the oil is proportioned somewhat to the load, particularly as regards the part of the lubricant which finds its way to the pistons and cylinder walls. Our readers are familiar, no doubt, with the system as used in the Marmon, Midwest and some other engines in which the vacuum in the intake manifold controls the oil flow. This has worked out very successfully and this year we find an approximation of the same results in the use of an inter-connection between the throttle and the oil feed, this being employed in the new Lycoming engine and in the Falls engine employed in the Dort six. Speaking of the Falls engine used in the Dort, an

outstanding feature is the fact that it has a built-in pressure feed which takes care of the entire overhead valve mechanism.

With this installation, oil is led under pressure through the rocker shaft, then through drilled passages through the rocker arms to the top of the push rod. The top of the push rod ends in a cup in which the ball end of the rocker arm operates. Oil flowing under pressure from the rocker arm shaft through the drilled rocker arm comes out through a hole in the ball and into this cup. This keeps the cup and ball continually lubricated and provides a liberal film to cushion the shock. A lead passes down through the push rod to the tappets so that the cam contact is also lubricated, giving a complete return system through the valve action.

Full Pressure on Lycoming Engine

The new Lycoming four employs a full pressure feed system, oil being carried under pressure to all main, connecting rod and camshaft bearings. In accordance with usual practice, the pump is driven by spiral gears off the camshaft and the pump discharges directly into a distributor tube cast into the upper half of the crankcase. This tube is connected

by holes drilled through the webs to all the camshafts and main bearings. A nozzle on the front end of the distributor tube directs a continuous stream of oil on the timing gears. The valves, push rods, pistons and piston pins are lubricated by an oil spray from the crankshaft. The oil pressure varies from 2 to 5 lb. at idling speeds up to 25 lbs. wide open throttle. A pressure relief valve is provided leading into a by-pass back to the oil reservoir. The relief valve is connected to the throttle control, as previously explained. In this way, the oil pressure is regulated to conform to the load on the engine.

Growth of Full Pressure System

A survey of the passenger cars on the market shows that only nine are now using the straight splash system, the full pressure or forced feed system is used on 72 models and the combined pressure feed and splash on 83. On the combined pressure feed and splash, the spray thrown off the end of the connecting rods is relied upon to lubricate the internal bearings with the exception of the main bearings and timing gears, in most instances, although a few installations incorporate the cam shafts.

With the full pressure, practice is divided between the use of a lead in the wrist pin and reliance upon the spray thrown off the lower end of the rod to take care of this point. Improvements in lubrication have not been restricted to the system itself, but have also been affected by improved piston rings, new methods of crankshaft drilling and other changes in the parts themselves, particularly with a view of preventing oil pumping.

Realizing the value of assuring owners that their products are free from oil pumping, car manufacturers have given a great deal of weight to this question. The Oakland company, for instance, now gives a 15,000 mile guarantee on its cars against oil pumping. This has been effected by concentrating on very careful fittings of the pistons and rings. At the

plant of the Hudson company, some very ingenious jigs are used to assure alignment of the connecting rods so that there is no tendency to cock the piston in the cylinder bore, which has been alleged by service men to be one of the principal causes of oil pumping. The Lincoln company has achieved very good results with rings having a groove cut in them at an angle inward from the bottom edge, so that the face of the ring is of normal width, but the lower edge is sharp instead of being a 90 deg. corner. It is claimed that such rings are particularly effective when used on a piston having large oil return slots below the bottom ring.

The honing method of finishing cylinder bores is also stated to have helped considerably in increasing the oil mileage. In a recent discussion of this subject before the Society of Automotive Engineers, the experimental engineer of the Lincoln company stated that with the honing method of finishing and with properly fitting pistons and rings, it had been possible, in his experience, to increase oil mileage from 400 to 2,000 miles per gal.

The problem with the pressure feed system is to be able to supply oil liberally to the main and connecting rod bearings, but to restrict the amount which goes to the cylinder bores. A great many engineers favor splash guards arched over each crank throw which protects the cylinders from an over-supply and still permits any quantity to be circulated through the connecting rod bearings. This type of baffle is claimed to be far better than the usual type placed across the bottom of the bore, because, with the latter, the air draft through the central crank carries up immense quantities of oil.

Valve Stem Lubrication

That engineers are giving increased attention to the lubrication of valve stems is quite apparent. A very good illustration of this point is the practice now followed by the Buick company of putting a felt packing inside the valve spring

around the valve stem and saturating this felt with oil. This naturally keeps the valve stem constantly supplied with an oil film and, consequently, reduces the chances of sticking in the guide, as well as increasing the life at this point.

There have been put on the market recently some oil reclaiming devices which take a portion of the oil and pass it over a heated coil with sufficiently high temperature to vaporize any of the volatile elements which have been discharged into the crankcase. It is claimed by the makers of these devices that a great amount of crankcase dilution is inevitable and that a device of this kind would tend to destroy the bad effects of such dilution and to put the oil back in the proper condition for lubrication.

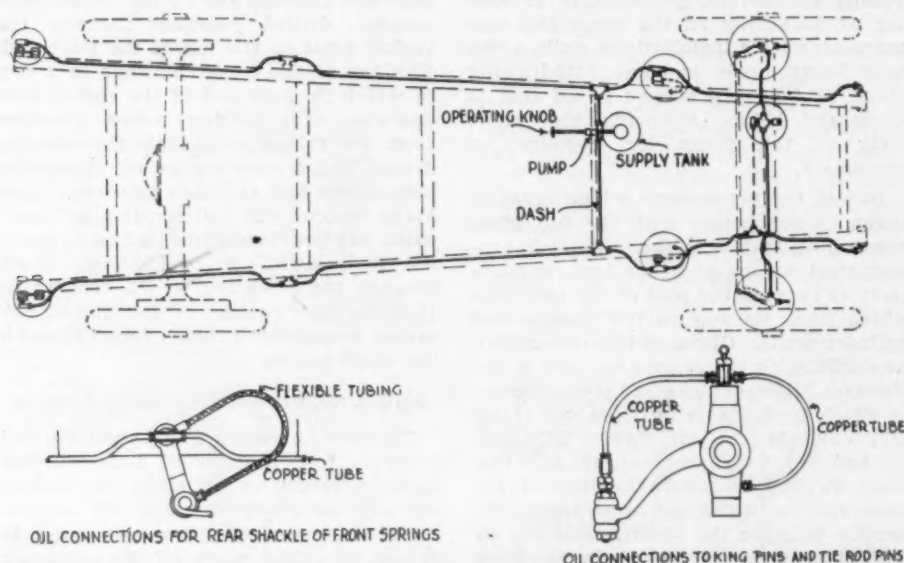
Lubricating the Chassis

Chassis lubrication has, of course, received considerable attention during the past 2 or 3 years, particularly with the almost total abandonment of the grease cup on all except a very few parts. Oil cups and pressure oiling systems such as the Alemite and others have proven to be very satisfactory. There is still a great deal of interest in a centralized lubricating system which will reduce the amount of unpleasant work for the owner. The Kellogg Pump Co. has put such a system on the market, this being controlled by a foot or hand operated pump which forces the lubricant from a small container generally mounted on the front side of the dash. Oil passes from this through copper tubing to the various points of the chassis requiring attention. Small reducing valves consisting of washers pierced with variable sized holes for proper distribution of oil are employed so that the amount of lubricant each point receives is in proportion to the amount required.

Automatic lubrication is highly desirable and manufacturers are gradually coming to realize this point. In the Buick, Gray and other cars, the front universal joint is now so arranged that it is lubricated from the transmission case. Since this joint is probably in the most inaccessible location of any bearing surface, the owner has been very much benefited by the automatic feature at this point.

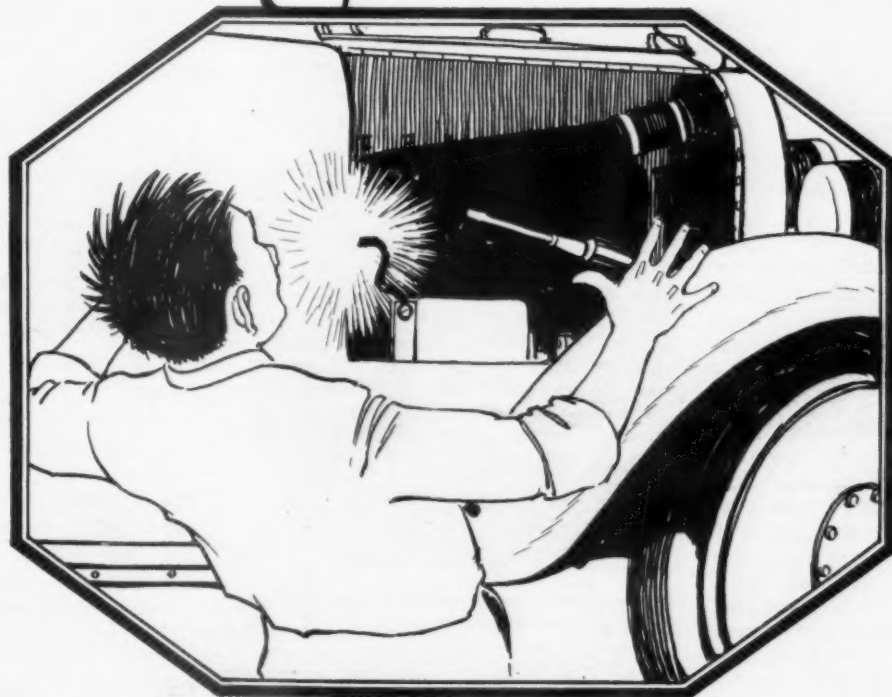
Glimpse Into the Future

If we were permitted to make a prediction in regard to oiling systems, we would state that the improvements which are to be effected would include the increased use of automatic chassis lubrication, and provisions for more readily draining not only the crankcase, but also the transmission case and rear axle housing. In spite of the fact that these are all necessary periodical jobs, they are all so arranged at the present time as to be particularly inaccessible and unpleasant. It should not be a difficult problem for a clever designer to so arrange the drains on these three housings so that the owner could handle the work without the risk of soiling his clothing and without the necessity of crawling beneath the car.



This diagram shows the installation of the O-K oiling system made by the Kellogg Mfg. Co. A single stroke of the pump on the dash forces oil to all chassis points. The smaller diagrams show how shackles and kingpins, tie rods and spindles are oiled

Less Bugs in the Juice



*Car Purchasers Demand a Product That Can Be Maintained at Small Expense.
This Applies to the Electrical as Well as the Mechanical Details of the car.
Automobile Makers are Recognizing This Fact and the 1923 Creations
Reflect Their Efforts*

"YES," said the salesman, "it has a Bunko electrical system, never needs oiling, never requires repairing, will last for the life of the car, and is guaranteed against everything."

The prospect nodded in humble assent at such superior display of wisdom, signed on the dotted line, and lived unhappily thereafter until he drove the car into the river. But those days are no more. The customers that fell for those glowing words fall no more, for Mr. Car User has had one or two and perhaps half a dozen cars and he wants the salesman to get down to brass tacks, and leave the flowery speech for the politicians.

Car users more and more are remembering their experiences in getting repairs made and are demanding construction that renders the repair bills less. The argument from the maintenance man about the difficulty of getting the generator off, or of retiming the ignition after working on some other electrical unit, still sticks in the owner's memory. So it is that cars must be sold on their merits, and the job is no longer one for the orator, nor the order taker.

Hiding the Battery

Makers of motor cars, with their ears to the ground, are taking heed of this demand on the part of prospective purchasers, and are laying out the electrical system accordingly. One detail that is

affected by forethought or lack of it on the part of the manufacturer is battery location. From the standpoint of the battery alone, it should be in plain view where the user of the car would not fail to check it frequently to note its condition of charge and its need of water. From the appearance standpoint, however, even the running board type of battery box has been banished, so that this important part of the car is doomed to do its work unseen.

The next question is a choice of the most accessible place, where the battery, although out of sight, may not be entirely out of mind, and among many cars a location under either the front floor or under the front seat seems to be quite popular. Examples of such cars are the Lexington, Rickenbacker, Kissel, Chandler and Winton, where the location under the front floor is used. The location under the front seat on the other hand is favored by such cars as Hupmobile, Buick, National and Dort.

Special attention to the battery installation is made on some of the cars even after a good location has been selected. In the under seat location it has been customary to have a lattice work cover of wood, that acted as a sort of cover for the battery, and on top of which the front seat cushion rested. When putting water in the battery, it was then necessary to raise both the cushion and this cover.

In the Hupmobile, the process of taking care of the battery is simplified by the use of a special type of front seat cushion. This cushion has a base or foundation made of heavy woven wire, so that no supporting surface is needed. The cover over the battery is then dispensed with, and the cushion only must be lifted when adding water.

There has recently been started a discussion as to the advisability of supplying free service to car owners as far as adding water to the battery is concerned. This is due to the fact that many battery stations have felt it a hardship to have to add water to the customer's battery every two or three weeks for a period of a year or two. The trouble has not been in the time spent in adding the water, but the labor necessary in removing floor boards, before the real job could be done. Many cars with the battery under the floor, have the board held down with screws. On the other hand some of the automobile makers have come to realize the importance of accessibility in this particular by making the floor easy to remove.

On the Kissel car, for example, while the battery is under the front floor, it is only necessary to take up a small trap door, slightly larger than the battery. The board at the other side is separate and does not have to be touched. Then instead of using screws

to hold the small section over the battery securely, it is held by spring clips at the edges, and a finger hole is provided so that it can be easily lifted.

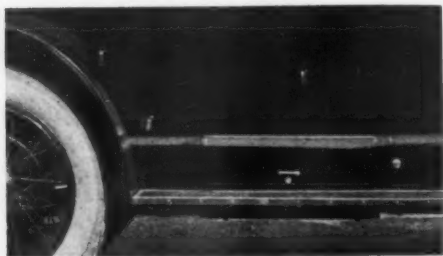
Tearing Up the Floor to Get at the Battery

A number of other cars using the front floor location also make provision so that but a small section of floor must be lifted, but here and there a car will be seen where not only a large section of floor must come up, but where the job includes solving a puzzle as well. The puzzle relates to getting the board up from around the gear shift and brake lever, at the same time avoiding the cowl board and the seat cushion. We hope that such cars will soon follow the example of their more progressive fellows.

Another battery location that has quite a number of exponents is the running board shield, where the long type battery is used. A sheet metal box is usually built in as part of the shield, and the battery is reached by removing the front or outer portion of this box. This portion can usually be taken out by turning two latches, which are sometimes capable of being turned with a screw driver, sometimes by hand. Among cars that use this location are the Cadillac, Stutz, Peerless, Cunningham and Stevens Duryea.

A novel location used on the Noma car is under the hood. A bracket is used on the front of the dash, and the long type of battery is used, it being cross-wise of the car, as it rests on the support brackets. The ground connection requires but a short cable as one of the cylinder head bolts is used to hold the ground terminal securely to the engine. The live cables running from the battery to the starter switch and from the switch to starting motor can also be quite short with this battery location.

Most of the cars of today show that considerable thought has been used in selecting a place for the battery. In this respect accessibility has been the

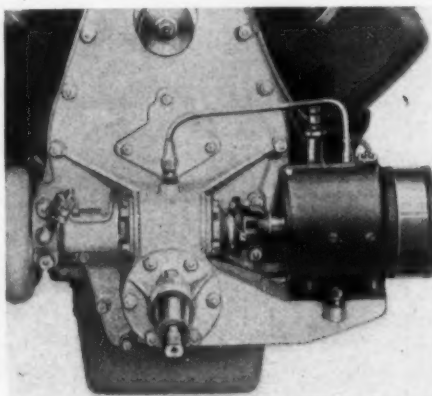


Runningboard battery location simplifies inspection and filling

foremost consideration, but care has also been used in most cases to keep the battery away from the exhaust heat as much as possible, so as to keep the natural evaporation as low as possible. One example of lack of forethought in this direction, however, is seen in a car where the battery is literally surrounded

with exhaust pipe. The muffler is right in front of the battery, and the exhaust pipe leading from the muffler swoops under the battery and then up on the other side, in order to clear the rear axle.

A battery in such a position may give good service, but it will certainly require water oftener than if located in a cooler place. The buckling of plates which is usually attributed to over-



The separately mounted generator makes maintenance easy

heating due to the passage of current, would also seem to be a condition that might be more frequently encountered under these circumstances.

Accessibility of Electrical Units

Ease with which the starter, generator or ignition unit can be removed for repairs, depends to a great extent on the arrangement of these units on the car. All three are now seldom found in combination, and the most desirable arrangement from a maintenance standpoint, at least, is to have them all separate. On many cars, however, the generator and starter are built as one unit, where there are also a number that use the combination generator and ignition unit.

In the larger places, where established electrical service stations have complete stocks of parts, the exact arrangement of the electrical units on the car is of less consequence. This is due to the fact that the car can usually be brought in in the morning and can be obtained in the evening. In the smaller communities, however, it may happen that a motor generator is removed, and then it is found that some part necessary for the job is not available, and must be obtained from the factory, or nearest distributor.

Under these circumstances, if it is the generating feature that is at fault, the driver is also deprived of his starter. On the other hand, if the car had been equipped with a separate starter and separate generator, the starter could still have been used.

With the combination of ignition with the generator, a greater difficulty is encountered if the generator has to be

taken off for repairs, and the writer has seen many a case where the car was tied up and could not be used, while the service station was waiting for an armature. It is of course possible to rebuild the generator with the defective armature merely so that the owner of the car may use it. This, however, entails a loss to someone.

Who Pays?

If the customer pays for the extra labor, the repairs cost him much more than they should and if the shop stands the loss, it is allowing the profits to be eaten away. In either case it is a loss to the automotive industry, either by direct loss to the shop in question, or indirectly by the dissatisfaction in the mind of the customer.

Another bad feature of the installation of the ignition unit on the generator is the fact that every generator job means a retiming job, and while experts in the shop may get this down to a fine point, it involves unnecessary labor, nevertheless. In the smaller shops where the men are not so sure of themselves on timing it may mean several hours labor added to the customer's bill.

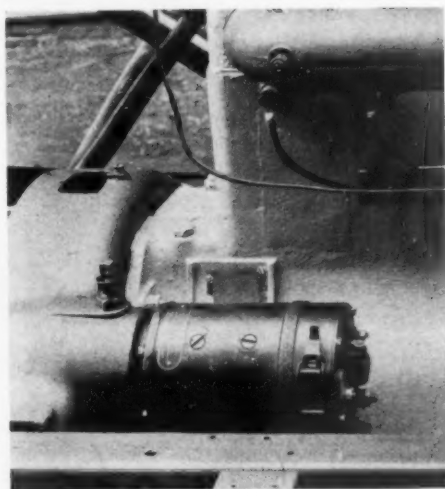
On the other hand with all units separate, maintenance is comparatively simple. If the ignition unit is at fault it is easily removed for the necessary repairs. If either the generator or starter must be worked on, the others are not affected, repair bills are lowered, without reducing the shop profits, and the owner is more likely to get continuous service from his car.

Generator Accessibility

With even the separate generator there is considerable variation in its accessibility, depending on the amount of thought that is given to such considerations. The ideal application from the maintenance standpoint, and therefore from the customer's standpoint, is one in which the generator comes off easily and does not affect the rest of the car. One car violates this principle of simplicity by driving the water pump from the generator shaft.

This means that while the generator is being repaired that the car can not be used. The water pump is easily disconnected so that if all parts are available the disadvantage is not great, but in the case of the car being repaired in a rural community, it might cause some trouble.

Another case where the operation of the car depends on the generator being in place, is the front end where chain drive is employed, and the generator sprocket makes up one corner of the triangular drive. From an engineering standpoint, this makes a convenient layout, as the upper two holding bolts of the generator end bracket may be loosened, and the generator swung



Sleeve mounting of the starter makes removal simple

around the lower bolt, to tighten the chain.

From the maintenance standpoint however, the design is not quite so good as the chain must be carefully held up when the generator comes off to keep from losing the timing of the cam shaft and perhaps the ignition as well. Cars using this construction usually provide an inspection cover at the front of the crank case and in line with the generator shaft, and this can be removed when working on the generator.

Possible But Not Easy

As the generator is backed out, it is then possible to insert the fingers at the front and work the timing chain off of the sprocket. A screw driver or other tool can then be inserted through the chain to keep it from falling down into the crankcase.

On some cars an improvement in this respect has been secured, by having the sprocket turn on bearings other than those of the generator. The generator is then mechanically driven by this sprocket, by means of a splined or squared shaft, which fits into the sprocket, when the generator is in place on the engine. Removal of the generator does not then affect the running of the engine, except that an opening is left where oil may get out, and in an emergency this could be stopped with a cardboard plate made up for the occasion. On the Packard Single Six this construction is used, but the three generator nuts must be replaced to hold the sprocket bearing in place.

Generator Mounting

Aside from the method of driving the generator, the method of mounting also affects the ease of removal. On a number of cars this has been reduced to a job of a few minutes, by means of a clamping band, which is easy to release. The generator may rest in a saddle, or on a flat surface, with dowel pins for locating it. The clamp band then comes over the generator and holds it securely in place, the holding bolts

on the band being readily accessible. The National car, for example, has this method of generator mounting.

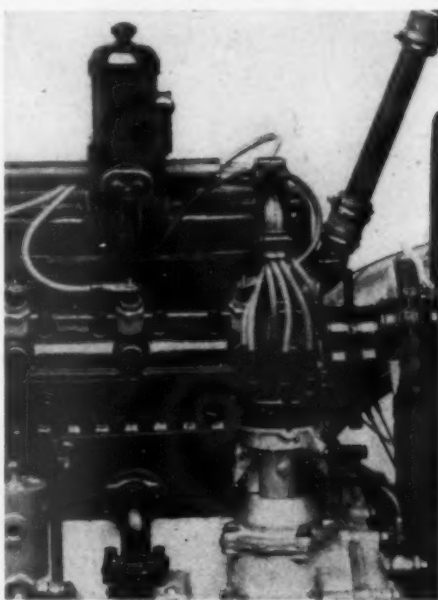
A variation in the method of attachment is encountered in Chandler cars where a Bosch generator is used. These cars have engines in which a web extends from the engine over to the frame of the car so that no side pan is required. The generator sets on this web and is attached by cap screws which enter from below much after the fashion of a standard magneto mounting. Aside from these cap screws it is also necessary to remove two coupling bolts in removing the generator.

On cars where front end chain drive is not used, the generator usually carries a gear which meshes with the gear on the cam shaft, when the generator is in place. This method of drive makes it easier to get the generator off, as there are no coupling bolts to take out. On the other hand it is not quite so good if the car is to be used without the generator, as it is necessary to close up the opening against oil leakage.

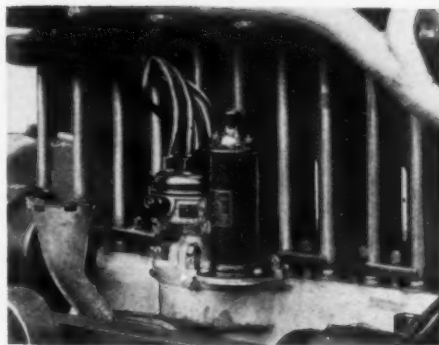
Starter Mountings

The mounting of the starter on the engine is such that it is not much of a job on a majority of the cars to get the starting motor off. Perhaps the most common method used is the flange mounting where two or three cap screws are removed. On the Rickenbacker, for example, three cap screws are used. Lexington, Hupmobile, Liberty, Dort, Winton, Franklin, Gray and Earl also having starters held in place with three cap screws or nuts.

Another accessible mounting is the sleeve type, where an extended portion of the starter end bracket is turned so as to be an easy sliding fit in the opening in the flywheel housing. With this type a large set screw is used, the removal of which permits taking the starting motor off of the engine, so that



Ignition distributor and coil are accessibly mounted on the Rolls Royce "Twenty"



Closed circuit Atwater Kent ignition, accessibly located on Franklin

this method probably takes the prize so far as the maintenance question is concerned. Velie and National, for example, are cars where, by this method of mounting, the starter removal has been made easy for the service man.

On the McFarlan car the band method of attachment, which is frequently applied to generators, has been adopted with success for the starting motor, two clamp bands being employed for the sake of security. On the same car the generator is removed by loosening one clamp band and taking out two coupling screws.

Ignition Trends

The job of supplying the spark plugs with the necessary high tension current is falling more and more on the battery. Magnetos are still seen on occasional cars, for example, the Chandler still uses magneto ignition, while Stevens Duryea has a Dual magneto, so that the necessary electrical energy can be taken from the battery or from the magneto itself, the same set of plugs being used in either case.

In battery ignition the closed circuit type is being used now practically universally. Franklin cars, which for a long time favored the open circuit type, on account of the saving in battery current now use closed circuit ignition. This is an Atwater Kent outfit built with automatic advance, so that the spark is always timed to get maximum efficiency from the engine. To avoid knocking on a hill or when under a heavy load, a spark adjustment is provided on the cowl board.

This consists of a knob which when pulled retards the spark. When the knob is released the spark is again advanced to the point for most efficient operation. The trend in favor of the closed circuit ignition is directly in line with the desire of engineers to make all parts of the car as serviceable as possible. Serviceability is obtained with the closed circuit ignition, which is more rugged than the other type and not as sensitive to variations in adjustment of contacts and spring tension.

The saving moreover, in battery current, as effected by the open circuit type was more a theoretical than an actual advantage, for it was less than an ampere when running. Such a small amount

would never be noticed as far as service from the battery is concerned.

Protection for the Coil

Heat is the enemy of all electrical apparatus, and the work that most electrical units can do is limited by the allowable heating. The ignition coil is no exception to this general rule, for the effectiveness of its insulation and hence its ability to deliver the sparks is reduced when it gets hot. Ignition coils must deliver from 4000 to 6000 volts depending on the spark plug settings and the compression in the cylinders, and the wax and paper in the coil must withstand this voltage.

Engines in the past have been made where the only place that an ignition generator could be mounted was right under a hot exhaust pipe, and the weakening of the insulation due to the heat gave a great deal of trouble.

Such experiences have been remembered by engineers in laying out later cars, so that it is now common to see the ignition coil so located that it is not subject to excessive heat. In many cases this leads to the placing of the coil near the front of the engine where the air through the radiator is comparatively cool.

Here the location is ideal except for the fact that water coming through the radiator openings has some tendency to short the coil. This is not a thing that can permanently affect the coil, however, and with the bakelite and similar materials of which coils are made, the water does not form a film, but goes off in drops, like water off a duck's back. Only when a layer of dirt and oil has been allowed to accumulate over the surface of the coil, is there any tendency for the water to collect as a film, and short the coil so that the engine will stop.

Even this possibility, however, is guarded against in some cars, Velie, for example, using a waterproof hood over both the coil and distributor, while on Cunningham cars, the coil is mounted in front, but protected by an aluminum guard, which keeps water from getting on the coil.

Insures Against Breakdown

On eight or twelve cylinder cars it is necessary for the ignition coil to produce sparks twice as fast as on a four or six cylinder engine making the same r.p.m. This usually means that the coil must be designed so as to draw more current, which produces a coil that magnetizes more rapidly. When such a coil is used, it is now becoming customary to use an ignition outfit, in which two pairs of contacts are used in the interrupter, these being so connected that the current is divided between them, and the life of the contacts is thereby increased.

Another way of accomplishing the same thing is to use two coils such as would be suitable for a four or six cylinder engine, and have two sets of interrupter points in the same distributor, but to have these pairs of interrupter

contacts electrically independent. With this system a square or hexagonal cam is used, and the two interrupters are so located that the cam opens first one set of contacts, and then the other. In other words, two ignition systems are used and if one breaks down, the engine will still run on four or six cylinders. Such is the general nature of the ignition system used on Wills Sainte Claire eight cylinder cars and on the Packard Twin Six.

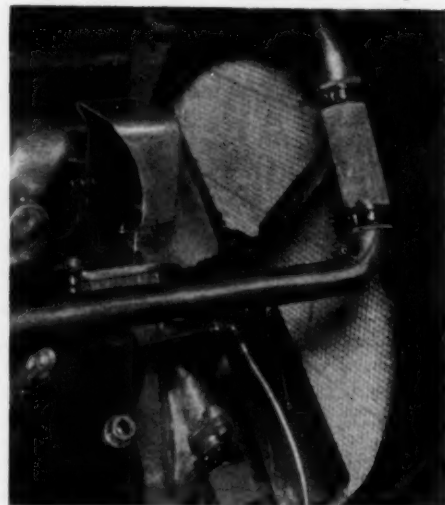
On the Packard Single Six, two interrupters are operated by the same cam but for a different purpose. One is used in connection with the ignition system, while the other is for the fuelizer. In an emergency, however, it would be simple to reverse the coils, and use the fuelizer coil for ignition service, or if one pair of contacts gave trouble it would be possible to reverse the connections at the interrupter.

Interrupter Accessibility

The rapid and continuous action of the interrupter contacts in breaking the circuit of the battery current to the coil, eventually results in burning or pitting the contact surfaces. Work with a file is then necessary to smooth up the points so that they will again function properly. This can hardly be done with the interrupter on the car, in most cases, and removing the interrupter also includes retiming the engine when the unit is replaced.

A radical innovation in this respect however, will be found on Hudson, Essex, Dort and Cleveland cars, using American Bosch battery ignition. The interrupter in this system is made with a separable cup, which is loosened with a thumb screw, so that it can be detached from the main portion of the

interrupter housing. This cup holds the interrupter contacts and the condenser, and can be replaced bodily in about two minutes, without affecting the timing; or if the interrupter points need truing up, the cup can be removed from the car and taken to the window or work bench.



Cunningham coil location keeps it cool. The aluminum cover protects it from water

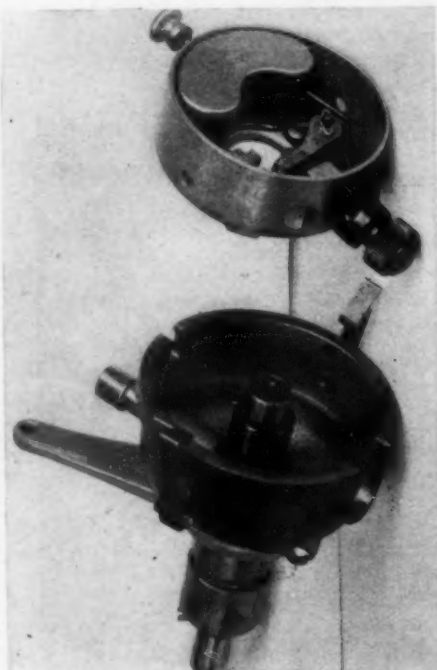
On Hudson and Essex the distributor also includes an automatic advance feature.

Another improvement in many battery ignition systems is the use of a balanced rotor for the distributor arm. Wear in the distributor shaft bearing would at times cause the cam to wobble around at certain speeds, causing variations in the interrupter gap. This in turn would affect the timing of the engine or the spark intensity or both, depending on the amount of wear in the bearing. With balanced rotor, centrifugal force, as far as action on the bearing is concerned, is practically eliminated so that synchronization of the sparks in the various cylinders is maintained, even after a considerable period of time.

Headlights

Not only from the maintenance standpoint has the design of cars been considered, for convenience and safety in driving have also come in for their share of attention. Various methods of dimming the headlights which have been used in the past have fallen far short of producing ideal driving conditions, and the various special lenses on the market have not always come up to expectations, especially when on the other fellow's car.

Recognition is now being given to the fact that lights which are suitable for passing an approaching car, are not properly directed for seeing the road a long distance ahead, and it is for this reason that a number of cars are using headlights in which the reflectors can be tilted. On Franklin cars, the tilting affects the central portion of the reflector only, and the change is effected by an electro magnet. The normal angle of



It's but a moment's job to slip the contact and condenser case out of this American Bosch distributor

the central portion is such as to direct the rays of light downward so as to light up the road near the car. This makes the lights suitable for passing an approaching car or for city driving.

When in the country, however, where the going is good, a button operated by the left foot is employed. This closes the circuit to the electro magnets and holds the reflectors so that a view of the road far ahead is obtained. Then when an approaching car is seen, it is only necessary to remove the left foot from the button. The foot is then ready to operate the clutch pedal, as might be necessary in rapidly bringing the car to a stop.

On Cadillac cars a tilting headlight reflector is also used, but in this case the whole reflector tilts instead of the central portion only. A mechanical connection with the reflectors is made instead of an electro magnetic one, and the operating button is located on the cowl board within easy reach of the driver. On Lincoln cars mechanical control of the reflectors is also used, the operating lever being mounted on the steering column.

Variable Dimming

Recognizing the value of a light adjustable to the needs of the driving conditions being encountered, the Duesenberg cars are equipped with an adjustable headlight controller. A lever at the lower part of the steering wheel operates the control, and the change in lamp brightness may be made rapidly, or slowly if desired, so that the eyes of the driver may accommodate themselves to the change in brilliancy.

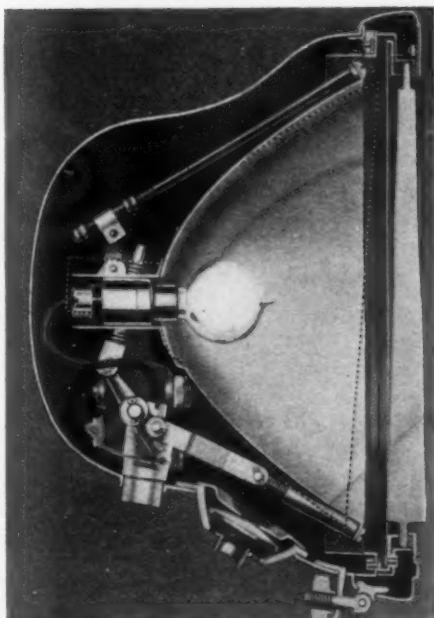
Not only in the layout of the headlights, but also in the other lights on the car, is the hand of the thoughtful designer seen, for the needs of the user are constantly in view in turning out the completed car. Increased use of closed cars has made the rear signal or stop light nearly indispensable, while its use on the open models is of course also a convenience and a protection. From an accessory which might be purchased by the car owner after the purchase of the car, it is becoming regular equipment on many makes.

Haynes, Stutz, Rickenbacker, Kissel, Duesenberg and Peerless are among the cars that have a combination tail and stop light as regular equipment. Peerless moreover take advantage of the tail light location, to mount their gasoline gage at the left end of the tank where its indications may be easily seen at night as well as in the daytime.

Spot Lights

Spot lights have also received the attention of automotive designers, and methods of connection are used that make it possible to turn the light to any position without danger of twisting off any wires or connections.

Two such lights made by Stewart Warner, are used on Duesenbergs, these being mounted, one on each side of the windshield. Spring contacts instead of insulated wire carry the current to the



Tilting reflectors such as this Cadillac type improve night driving conditions

lights, and in case a short should occur no harm can result, as the Delco ignition and lighting switch carries a circuit breaker which vibrates when any trouble occurs in the lighting circuits, which would tend to draw excessive current from the battery.

On Stutz cars a spot light is also mounted as regular equipment, it being located on the left side of the windshield. Peerless cars have also been equipped with spot lights, two being supplied.

Instrument Lights

Instrument lights on the cowl board have received the consideration that this problem deserves. At one time it used to be quite a question as to the best place to mount the light so that all instruments would be properly illuminated. The solution seems to be reached by using two lights on some of the cars, and in this way the lighting is quite effectual.

Shields over the instrument lights keep the rays from the driver's eyes, and the same forethought has been used, for example, in the body lights on Rickenbacker cars, where they are mounted in the rear corners. This, it is claimed, makes it possible to have these lights on while driving, without interfering with the driver's vision, as would be the case with the conventional dome light. On Buick cars the cowl light is operated by a button in the centre of the regulation lighting and ignition switch, and this button may either be turned or pushed.

When turned the light stays on permanently, but when the button is pushed the light is on only while pressure on the button is maintained. This makes it possible to drive with the light turned off, and yet be able to have the light for an instant only, if desired for the pur-

pose of getting the indication of some instrument.

The Delco lighting and ignition switch used on Peerless cars has a foolproof feature that should be appreciated by any car user, especially if he has ever had an official call down for driving at night without turning on his lights. This switch is so designed, that locking the ignition also locks all the lights except the tail and dash lights which may be left on for parking purposes.

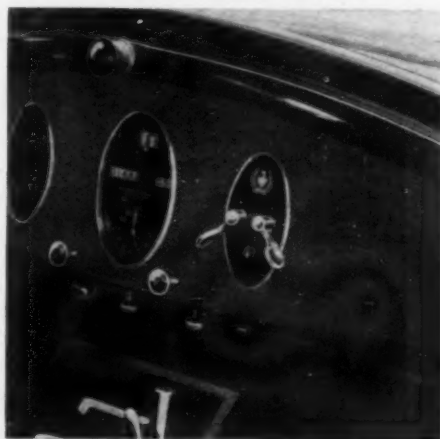
If on the other hand the car had been left in the garage until after dark, the tail and dash lights could be turned on, and with the switch lighted up it would be easy to find the keyhole. The novel feature comes in connection with turning on the ignition, for when this is done, the lighting switch lever automatically snaps upward, turning on the head lamps.

Trouble Lights

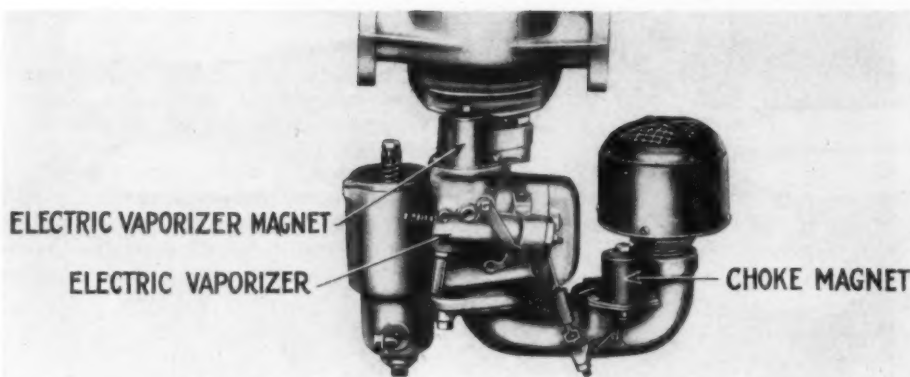
Recognizing that the user of the car may occasionally find it necessary to do small jobs on the car, and that such work may be necessary at night, the Earl designers have found it advisable to put a light under the hood. This is mounted on the front of the dash where it lights up the engine so that any minor adjustments can be easily made. National cars are similarly equipped with a trouble light under the hood.

On Cadillac and Cunningham cars, the trouble light is not only provided, but the designers of these cars have gone a step farther in making small jobs easily handled at night. The trouble light is located in a pocket in the dash, from which it can be withdrawn when necessary, and a 16 ft. cord on a reel makes it possible to use the light at any point on the car. For changing a tire at night, for example, such a light would prove invaluable. On the Cadillac two levers are used, one of which turns the light on and off while the other operates the rewinding device. On the Cunningham the rewinding is automatic, something like the action of a shade roller.

Ask the average car salesman where the fuses are located and he will prob-



This Peerless switch automatically turns on the head lights



Electricity does three jobs at once on this Franklin carburetor

ably be unable to answer. Possibly this is due to the fact that the prospect does not ask this question, but a year or two after the car has been purchased, he is up against it when a fuse needs replacing. The difficulty that both the salesman and the car user find in locating the fuses has been solved, for some time by placing them on the cowl board, and using a cover for the fuse box which is plainly labeled, "Fuses". Earl, Hupmobile and Kissel, for example, use this accessible location for the fuses.

On McFarlan cars the fuses are all located in a metal box mounted at the base of the steering column, where they are readily accessible by lifting the hood on the left side and taking out two screws that hold the fuse box cover on. On Lexington cars, the fuses are also found by lifting the left side of the hood, but in this case the box is mounted on the dash. Fuses on Chandler cars are readily accessible, by releasing a latch under the cowl board. This allows the fuse panel, which is normally horizontal, to drop down into plain view below the cowl board. When fuses are replaced the fuse panel is again pushed up out of sight.

Wiring

Improvements in wiring the car are seen in many makes, one feature being the increased use of conduit, which not only makes the electrical circuits more nearly proof against trouble, but reduces the fire insurance rate on the car. Other details that are influenced by the wiring, have been made such that the body can easily be removed without disturbing many connections. On Duesenberg cars, for example, the dash is made part of the chassis.

The cowl board also, instead of being a unit with the body, is supported from the dash by long tubular castings, so that the wiring of chassis, dash and cowl board is independent of the body. On Kissel cars the opposite method is used to get similar results, and practically all of the wiring is made part of the body assembly. Still other cars go to the use of junction boxes on the body, where the wiring goes to the chassis, so that removal of one body and the in-

stallation of another does not involve rewiring the car.

While the heat from the exhaust gases can be utilized after the engine is started, it is of course not available with the engine standing. Furthermore it is the starting condition that presents the greatest problem with the nonvolatile fuels being used. It is for this reason that various devices for electrically heating the fuel are coming into favor, these using current from the battery, and in addition to being obtainable as accessories they are also in many cases used as regular equipment.

On Franklin cars, such a device is used, the operating push button having a three-fold function. It allows current to flow to the heating unit. It also sends current to an electro magnet to operate the choker, and in addition works another electro magnet which lifts a needle valve and opens a by pass around the throttle valve. On Cunningham cars three buttons are used in connection with the carburetor control.

The one at the left is merely the needle valve adjustment. The middle one is the choker, which is pulled out for starting, while the one at the right is the primer. This is also a manually operating control as far as the carburetor is concerned, for it lifts a needle valve and opens a by pass around the throttle. At the same time, however, it makes a contact closing the circuit of the heating element.

On Lincoln cars an electric vaporizer is also used, it being called an "Electro Fog". Gasoline drawn into the manifold by the suction of the cylinders, falls into a pocket, which contains a heating coil. This hot coil vaporizes the gasoline which rises as a mist or fog which when drawn into the cylinders is readily ignited. In a demonstrating outfit of this kind used in the salesroom, the gasoline can be heard to boil.

Engineering Thoughtfulness

In investigating the features of various cars, one is impressed with the attention that is being given to details of design. One instance of this is in the layout of head light brackets which are now being made adjustable on some cars. Various head light laws are quite specific as to the direction that the head light rays

should take, and the old way of changing the direction of light rays was to use a crow bar on the lamp bracket. Adjustable brackets on Haynes and Franklin illustrate the way designers can co-operate with the maintenance division of the industry.

Other examples of improvements from the standpoint of the user or the shop are many and varied. Duesenberg makes the right part of the toe board, which has no entangling alliances with pedals or levers, easily lifted. This makes it easy to see the timing marks on the flywheel so that timing the ignition is simplified. The accessibility thus provided is also intended to make it a comparatively simple matter to adjust the clutch.

On Duesenberg cars a junction box is provided in the left head lamp bracket. This is reached by taking out two screws which hold a nickel plated cover, and keeps the wiring, not only well protected, but readily reached when necessary. On the same car a cigar lighter is provided, it being located in a socket in the rear of the front seat. When drawn out from the socket, the current is automatically turned on, and when replaced the current is shut off.

Wiring Standardization

While many things have been done to the cars of today to make the electrical system better and more easily maintained, there are still problems that need solving. One of these on which there has been a lot of discussion, but no definite and accepted movement, is the matter of standardizing the colors of wires used in various parts of the car.

The need of this will be appreciated by any man who tries to have the small town electrician do some electrical work for him, especially if the man in question has not worked on a number of cars of the same make and model. He may know electrical circuits, but he does not know the ones on that car, and the car user pays the bill. Nor, when we consider the multiplicity of wiring methods possible, and the variations in electrical systems, can we entirely blame the electrician.

A definite color scheme, however, would help a lot, where, for example, red would mean the charging circuit from generator to battery. Blue would mean head lamp circuits and other colors would in similar manner mean similar circuits on all cars. Nor is the color scheme the only way in which the electrical worker could be assisted, for a wiring diagram with the car would be of great assistance in nearly every electrical job.

Such a diagram could be shellaced or varnished under the finish on the front of the dash or could be made as a metal plate attached to the dash. Nor is it too much to expect, to see some such assistance extended by the manufacturer in the near future, for the dreams of today are the accomplished facts of tomorrow.

Refinements of Design Bring More Profits



Safety, Convenience and Comfort Are Built Into the Cars of Today. Such Cars Are Used, Not Stored, and It Is the Increased Use of Automotive Transportation That Spells Prosperity for the Industry

THERE are many features of the modern motor car or its accessories that are incorporated because of the appeal they make to the owner, and while automotive vehicles have become an undisputed necessity, in connection with our complicated civilization, it is still true that the use of motor cars must be made a pleasure as well as a commercial advantage.

The progress of the industry is based primarily on the good will of the ultimate consumer, so that the ability of the car to run and stand up for a period of years, must be supplemented by those refinements that make driving safe, convenient and comfortable.

Refinements of construction, devices that protect the car from injury or theft, accessories that make driving more comfortable and convenient, all accomplish many benefits not only for the owner but for the dealer as well. In the sale of cars, these things cut down sales resistance. In the servicing of cars, they afford an opportunity to make small sales in connection with the inspection of cars, which in many cases will more

than make up for the time spent by the contact man, in analyzing trouble and talking to customers.

Ease of Operation

The way that ease of operation increases the use of the motor car, and difficulty limits it, is shown by the attitude of an owner some years ago, before the demountable tires and wheels were in use. This man had plenty of this



The ventilator in summer is as essential as the heater in winter

world's goods and had a car as fine as any that were made at that time. It was a very warm evening and the family expressed a desire to take a ride through the parks.

Now, this man in question had a chauffeur, but on this particular evening the driver was having a night off, and while the owner of the car was willing to drive, he did not want to go out on this occasion because of the fear that he might get a puncture and have a big job changing the tire. This man in question was rather well along in years, somewhat portly, and the exertion of pumping up a large tire was something he did not wish to tackle, so that the evening was spent on the porch and the car was not used.

This illustration may be somewhat obsolete as far as the tires are concerned, but the unwillingness of the owner to use the car under difficult circumstances is still a trait of human nature that will either limit or extend the use of cars, depending on the foresight that is used by men of the industry.

Improvements in operations are being

incorporated in the factory production. One instance of this, which is being seen on a number of cars, is the use of ball or roller bearings of some type, in place of plain bearings in the front wheel king pins. This effects ease of steering, which facilitates parking in a crowded space, and makes it less difficult to work the car through traffic on a crowded boulevard.

Many a man living in a large city leaves his car in the garage, not because he can not afford to run it every day, but because of the difficulty of operating in heavy traffic, and anything that tends toward ease and convenience of operation will effect an increase in the use of automotive products.

Another detail of design that has received attention is the clutch, in which refinements of construction have made it possible to use a lighter spring, which in combination with improved linkage construction between the pedal and throwout yoke have made it possible to operate the clutch without any appreciable muscular strain. This also is appreciated by the driver, especially when operating through traffic where it is necessary to frequently slip the clutch.

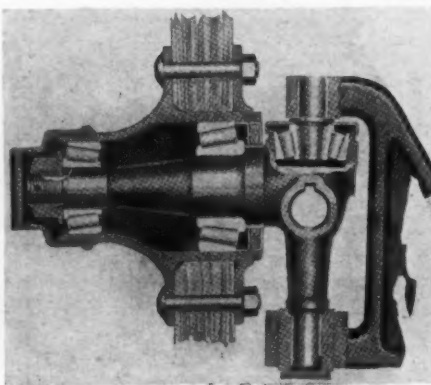
Improved methods of lubricating have also tended to make the car operate easier, both as to clutch and steering gear. In the case of the clutch, oilless bushings have in many cases been used in the throwout yoke bearings, while with the steering mechanism effective lubrication is often attained by the use of ollers which force the lubricant to all bearing surfaces under high pressure.

Comfortable Operation

Time was when an automobile ride in winter was a good chance to nearly freeze unless one should be practically buried in furs. On the other hand, a ride in the same car on a hot day might involve roasting, due to the heat of the engine and exhaust pipe, which would find their way into the front seat compartment. One way in which excessive heat has been conveyed away from the driver's position is by change in engine construction sufficient to allow of running the exhaust down the front of the engine, so as to keep it away from the body as much as possible.



Forethought behind. Lincoln uses a combination stop, tail and backing light



Roller bearings on the king pin make for easier steering

Tighter floor boards have also operated to produce the same result, yet with the use of suitable heaters the warmth that would otherwise go to waste can be instantly available when needed for comfortable winter driving.

Closed cars, used in ever increasing numbers, have made it possible to utilize the exhaust heat to greatest advantage, but even in the open type of car the use of winter tops is equally effectual, and when such a top is not used, the side curtains give a measure of comfort which a few years ago was hardly possible.

A comfortable driving atmosphere is moreover not only a question of heat but also one of ventilation, so that in the closed cars ventilators of various types afford relief from the stuffiness which might otherwise mar the comfort that the car should afford.

In many cases these are placed in the cowl so that a draft of air is directed downward and tends to dissipate the heat that does work through from the engine, and such a ventilator is equally effective on either closed car or phaeton, where in summer a circulation of air in the front compartment is desirable.

Refinements in construction have also been made in various cars for greater physical comfort. Better shaped cushions, deeper and more flexible springs, and change in design to get ample leg room have been factors in this regard. Increased leg room in the front compartment has in many cases been attained by changes in power plant design, such that the slanting footboards can be installed farther forward, while in some cars a change in the arrangement of the gear shift and emergency brake lever has been made. Such changes have been in the direction of mounting the emergency brake lever in front of and in line with the gear shift lever, so as to give more freedom of action in a sideways direction.

Safe Operation of Motor Cars

Emphasis placed by the daily press on accidents due to motor cars should impress all concerned with the vital necessity of making the motor car safer and more easily controlled. Publicity of this kind is harmful to the interests of

those in the automotive industry, and one way to combat negative advertising of this kind is to reduce the cause of accidents as much as possible. Aside from the human factor, the causes of accidents are being, to a great degree, eliminated.

Accidents which are usually of a minor nature can be reduced to a great extent by the increased use of rear signals which caution the car approaching from the rear, in regard to the intentions of the driver of the car ahead. These devices afford an opportunity for the maintenance station to defray the expense of the contact man by the sales he can make, while an indirect result is the increased confidence the owner attains, which results in more extensive use of automobiles.

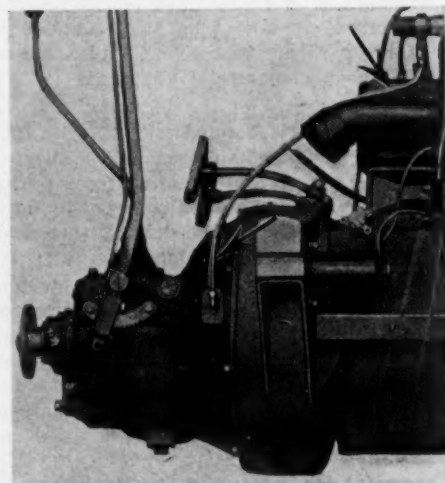
Accessories Becoming Regular Equipment

These devices are in some cases being supplied by motor car makers for use as regular equipment. Peerless cars, for example, using a combination tail light and warning signal.

A warning signal from the car ahead is not always sufficient to insure safety to all concerned, including the car itself, for in snowy or wet weather, the vision of the driver is often obscured by accumulations of water or snow on the windshield glass. Windshield wipers of various types have been very effectual in reducing the hazard from this angle, and the automatically operated type, using power from the engine or battery, should be especially valuable.

This type of windshield wiper leaves the hands of the driver free for the essential work of steering the car, shifting gears, and operating the horn, and makes it possible to see not only the signal of the car ahead, but also the chance pedestrian. These devices while at present falling in the class of accessories that are sold after the purchase of the car, will no doubt be soon classed as regular equipment on many cars.

Visors constitute another class of accessories which have been rapidly coming into favor, both as regular equipment on certain cars, and more popularly as an accessory that the driver demands to



The oil cup for the clutch throwout bearing on Kissel cars is at the top of the engine. A pipe feeds the oil to the bearing

protect him from the glare of the sun on wet or oily roads, and from the glare of the lamps of approaching cars. These visors are made in many styles adapted to all types of cars, both open and closed models and are rapidly coming into popular favor.

In the last ditch, or preferably before reaching that point, the tire chains and bumpers come into play, and while their use has extended over a considerable period, they are constantly gaining in popularity. Bumpers in fact are considered so essential, that it is quite common for the salesman selling a new car, to also sell bumpers to go with it, and the manufacturers are cooperating to the point where the cars come through with holes in the frame properly located for bumper attachment.

Protection and Efficiency

In the matter of protecting the car from operation by anyone but the owner, considerable ingenuity has been revealed, and many devices such as wheel locks and transmission locks are available. These are not new by any means, but their use is becoming much more extensive, a number of cars this year are equipping their product with transmission locks, where before, the ignition lock only was provided.

In the matter of efficient operation, a number of factors combine to give better service to the car owner. One of these is his own constantly increasing knowledge of automobile engines and a consequent increase in his proficiency in running them.

The second factor is the use of devices that enable him to use his knowledge to advantage. It is a matter of common knowledge that an automobile engine operates at greatest efficiency when it is heated nearly to the boiling point of water. When very cold, the oil does not flow freely, the gasoline does not vaporize properly, and the operation is consequently poor.

When overheated, on the other hand, the operation is also poor; the engine will knock, the oil becomes very thin, and expansion of the parts may be ex-



Bumpers are becoming so essential that they often come as regular equipment

cessive and cause the pistons to seize and score the cylinders.

At this point the use of temperature indicating devices comes to the rescue. The most commonly used type mounts on top of the radiator, and its indications can be seen from the driver's seat. Another type is mounted either on the cowl



Here selection of the right tools is doubly effective because there is a place to keep them

board or steering column and its indications are determined by a portion of the device which is located in the cooling water. Expansion of alcohol, operating through a small copper tube is usually employed to actuate the registering needle of the instrument, and with indications of the engine's temperature before the driver's eyes his knowledge of the engine can advantageously be used.

In winter the engine is usually protected from operating for long periods of time at a low temperature by a radiator protector or cover which limits the cooling action and allows the engine to warm up to its efficient temperature in a short time. The driver, using a heat indicator of some kind can depend on it to tell him when to open the radiator covering so as to allow greater circulation of air.

In other cases, thermostatic control of radiator covers is used, the cover in this case being of sheet metal with shutters which are actuated by the device. This gives under normal circumstances correct regulation of the engine's temperature, and the heat indicator could then be used as a check on its operation.

Making Maintenance Easy for the Owner

The efficient running of the car is not the only way in which the car owner uses his knowledge of motor cars, for the rank and file of automobile users do the common small jobs around the car themselves. This applies to oiling and greasing, washing and many of the minor jobs, such as cleaning the carbon out of the cylinders. Here we find that the forethought of the makers is also manifest. Tool kits that come with the car have too often been selected on the basis of so many wrenches for a dollar, regardless of whether they happened to fit any of the nuts on the car or not.

The cooperation of the tool makers themselves is now more and more available and in conjunction with the car manufacturers is resulting in tool kits,

in which all of the tools can be used, while formerly the pliers were used for every job and the rest rusted for lack of use.

The oiling of the car has also been made less difficult, by the installation in many cases of chassis lubricating systems of different types. Grease cups are being eliminated, and devices more easily operated, and really capable of getting the lubricant where it belongs are coming to the front. On Buick cars the oiling of the rocker arms of an overhead valve engine has been facilitated by small openings in the valve housing or cover. When these openings are not being used, they are closed by sheet metal pieces which slide into place.

Oiling of the car depends not only on the devices with which the car is equipped, but also on the owner's memory, as to when the various parts require attention. To help out in this regard, the Stewart Warner Speedometers are now made in a model, in which an oiling chart is incorporated. As various mileage indicators appear, they also show a color, which in connection with a chart shows the parts of the car that need lubrication.

At some other mileage point, some other color will appear, so that the driver is warned by the appearance of the various colors on the face of the speedometer, that lubrication of some part of the car is required, and by referring to his chart he can find exactly what those parts may be, and thus from careful cooperation with the maker of the car, he will get the maximum service from it.

Accessibility as far as oiling is concerned has also been carried to the design of the engine, where the oil filler necks are made such that a special funnel is rarely required. In similar manner the filler necks on gasoline tanks have been designed for easy filling.

Certainly mention should be made here of the progress which has been made in the way of making it easier for the car owner to drain the crankcase of his engine. The time seems to have arrived when it is no longer necessary for the owner to crawl beneath the car, unscrew a plug, let the oil run, and, incidentally, all over his arm and shoulder, replace the plug and then refill the crankcase. Today the trend is toward fitting devices which permit the owner to drain the crankcase by merely turning a small lever conveniently located under the hood. This convenience is probably the most appreciated by car owner and maintenance man alike. It ought to have the effect of owners draining the crankcase more frequently, too often neglected in these days of low grade fuel and consequent thinning out of the oil.

On many cars the tank is at the rear and may be rendered more or less inaccessible by a trunk carried on the rear or by the use of spare tires which may also affect free access to the tank. In such cases the difficulty is overcome by the use of a long filler neck which usually comes out to one side, where it is easily reached by the man at the filling station.

Sport Phaeton and Service Coupes Outstanding Features of 1923 Body Styles

Refinements in Body Lines, Hood Contours, Better Materials for Upholstery and Lavish Use of Nickel Plated Trimmings in Evidence. Pressed Steel Parts in Favor on Closed Bodies

PROBABLY one of the outstanding features in connection with the 1923 body types is the passing out of the phaeton as the most important body type of the American car manufacturers. Sport model phaetons and business or service coupes have forged to the front. There is a very generous use of nickel plated fittings and cars are more completely equipped than ever before. One concern, the R. & V. Knight company, goes so far as to furnish a set of tire chains with its new car.

Refinements in Evidence

Outwardly there have been no marked changes in the actual appearances of the bodies, the greatest percentage of change being in the nature of refinements only. Thus we see changed radiator contours, smaller wheels, lower bodies and similar items instead of radical changes in mechanical makeups. In fact, mechanical changes of a radical nature hardly can be expected at the present time unless the industry comes to the conclusion to use some other fuel than gasoline in propelling motor vehicles. As long as we use the Otto cycle in our engines we are likely to see cars remain unchanged so far as mechanical layouts are concerned. Present indications are that engines and cars will be pretty much the same as they now are, with only refinements here and there to adapt them to the changing nature of the fuel, traffic conditions, or any other economic conditions.

In previous years it was possible to determine the age of a car by its appearance. Looking back 10 years, it was quite possible to tell the 1912 car from the 1913. Not so much difference will be found in the external appearances of the cars of 1922 and 1923, with the exception of a few which have made decided revisions of their lines. A good example of this is the Peerless company, which, under the new organization, is producing an entirely new design of car. The new Peerless is quite unlike the previous Peerless, although it does not incorporate in its design anything of a radical nature, but follows along the lines of improved practice with minor differences which give the car its own characteristic individuality.

Somehow, in all decorative or art work, there seems to be found a continuous trend toward the straight lines. If we look at railway practice and compare the first of the railway coaches with those of the present day, we find that the old-time railway coach was a thing of many curves and scrolls. Today the modern railway car is practically a rectangular box. While the present-day automobile bodies cannot be called rectangular, they are certainly far more nearly so than the types of previous years. Straight line side rails, straight line hoods and somewhat square radiators are the characteristics of the average 1923 model. Dodge, Chevrolet, Peerless and Marmon have straightened their lines this year.

Along with the straightening of lines has come the lowering of the bodies and all of these concerns, together with Buick, are using lower bodies this year than ever before. Chevrolet, Dodge and Peerless have changed their radiator contours to abide by the season's style in body lines.

Another phase of the appearance development of the automobile shows itself as an aftermath of the war. During the war days we were ashamed to own anything which might have been termed a purely luxury or amusement product. The sport model would have been frowned upon in 1918 and 1919. In 1923, however, it is decidedly in favor. These cars, as their names indicate, have been designed for pleasure purposes and are very often owned by those who are fortunate enough to possess two or three cars. Nevertheless, there is a utility feature about them and particularly in the middle west and western cities they are used in much the same way as the ordinary touring car.

The new low priced enclosed cars designed to be manufactured at the lowest possible price, are naturally as free from curves as it is possible to make them. Curves are expensive and since the effort has been made to keep the manufacturing costs of these cars as low as possible, it is quite in order that they should all be more or less of the straight-line type and this is found to be the case.

Growth of Business Coupes

The Essex coach, which is really the pioneer in this field, is a straight line vehicle and has been kept so. The business and utility coupes and sedans follow along this same line. Even in the more expensive enclosed bodies this same tendency toward straight lines, flat roofs and lower appearance has been followed. To emphasize the lowness, we find that rear windows are broader and flatter. Smaller wheels are also in favor, one of the concerns which has reduced its wheel size this year being the Peerless company.

During 1922, which has proved to be an epoch making year in the automotive body business, we have seen the introduction of the all-steel enclosed bodies. This accomplishment represents a tremendous stride in the pressed steel and body building industry. It is, of course, impossible to manufacture an all-steel



This car represents very clearly the trend toward the sport type of enclosed car. It has all the characteristic fittings of the latter, such as trunk, disk wheels and drum type lamps. The car is a Chalmers

enclosed body without making a large quantity job of it. It is quite apparent that the tremendous die cost for the pressed steel parts for such a body can only be absorbed through tremendous production if the real benefits of pressed steel are to be derived.

On the other hand, if it is possible to eliminate wood altogether, as the Dodge company has recently done, it is possible to save money in other directions outside of manufacturing. One of the biggest sources of saving is in the finishing of such a car. Instead of using fifteen or more coats of paint, it will be possible to get down to two or three coats of hard baking enamel, which can be governed more uniformly and also provides a surface which stands up under weather conditions and successfully withstands the abuse given in the ordinary washing process.

In these cars the wood base for upholstery is applied after the enamel has been finished, so that there is no wood in the body which is subjected to the destructive temperature required for the hard enamel.

Use of Steel Body Parts

There has been a tendency all through enclosed car body work to use pressed steel parts in place of wood. This eliminates a good part of the hand fittings and, consequently, results in the ability to produce the closed car body more cheaply. The industry is still wrestling with the problem, however, of cutting down the amount of expensive hand work required in the trimming of upholstery operations. This is being accomplished to some extent by so designing the bodies that subassemblies may be employed which will eliminate the necessity for hand fittings. This requires the highest class labor and owing to the awkward position of the operator in performing the work, it is necessarily expensive and laborious.

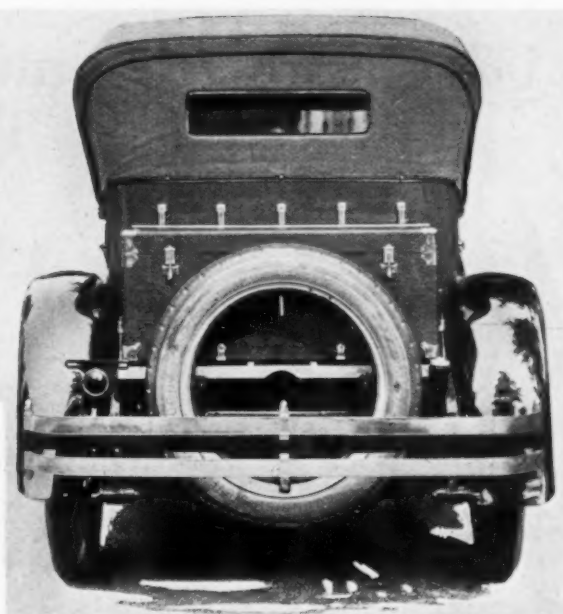
It will be noted in going over the cars at the show this year, that a number of the concerns which had the low-priced, utility enclosed bodies on the market a year ago, have made alterations which, as a general rule, make these bodies of more permanent and durable construction. In some instances it is quite likely that a slightly greater price differential between the open car and enclosed car will result from these improvements, but the general trend is downward because of the adoption of better production methods in the body departments.

Nickel Trim Accepted Standard

Some of the appearance changes which have been made throughout the year are quite general to the entire field. An example of this is the drum-type head lamp, which has become practically universal this year. Nickel trim is, of course, the accepted standard, and in the sport model it is quite customary to keep the nickel finish on parts which, on the standard touring types, are black enamel. The greater use of disk wheels



Above, how Mitchell dresses up the F-50 models, with visor, cowl lamps and shields. Right, typical rear end layout of sport car. This is a Jordan



and their almost universal use on the sport model has left its imprint on the 1923 car.

A combination utility and appearance proposition is the California style top, which will probably come into even greater vogue this year. This year we find this style of top on the Peerless, Moon, Marmon, H. C. S. and other makes, the general construction of the top following in appearance along the lines of the standard folding top, but made more rigid and durable and with provisions for side windows which give practically an enclosed vehicle for winter service or stormy, summer weather.

Another one of the year's features which is practically universal is the general cleaning up of the dashboard. Some of the large speedometer makers have brought out a combination unit in attractive casings which have done much to clean up the appearance of the dash and also to render the instruments more visible. There are some particularly attractive assemblies which combine the speedometer, clock, ammeter and oil gage and a great number of combination speedometer and clock dials which are very attractive and compact. There are also quite a few examples of where the dash has been cut away to give additional knee room to the passenger in the front seat. Quite a few of the makers are using heavier stock in the fenders and also a deeper crown, which has resulted in a material improvement in the appearance.

From the standpoint of equipment, the 1923 automobile is better than any of its predecessors. Not a few are now giving windshield wipers and, in the enclosed cars, rear view mirrors as standard equipment. From the standpoint of looks, a car with complete equipment is always a better appearing vehicle. On the sport models, many are fitting the DeLuxe type of motometer, which is a

much more massive instrument than the regular model, and this tends to show off the front end of the car.

On a great many cars, also, the splash aprons at the front and the apron covering the gasoline tank at the rear have been extended downward to hide structural parts of the chassis and to give a more finished appearance to the car. On the Buick enclosed model and on the sport model, aluminum kick plates are fitted on the running boards and on several makes of cars using a molded rubber matting on the running board, the scraper pads are incorporated in the running boards with a material gain in appearance.

Hiding Structural Parts

Summing up these detail refinements, it is quite evident that far more attention is being given to the matters which were previously regarded as simply minor details. These small refinements individually amount to very little, but taken together throughout the entire car have resulted in a more highly refined vehicle than has ever before been offered.

The four or five passenger coupe of the two door and tilting front seat variety as illustrated by Cole, Packard and Nash, shows the extreme diversity that this type includes. This form of construction is in more favor this year than last in that it now seems to be more of a reality than experiment.

Perhaps the business coupe for two passengers will tend to take the place of the offset seat type and create the need for a more commodious and larger body. This would seem to be a sensible solution of the coupe seating which in the past has been almost anything from two to four. Now that the business body is distinctly for two passengers there will probably be more of the larger size bodies made for the other uses which do not call for a sedan size.

Used Car Accounting Methods That Pass U. S. Tax Inspection

By WALTER B. GUY,

Taxation Counsel, National Automobile Dealers' Association

AS THE time approaches when each dealer must close his books for the year and begin preparation for the annual seance with the United States Internal Revenue Bureau, many inquiries are made with regard to the proper methods of preparing inventories. In the hope that some of the dealers' difficulties may be anticipated and prevented, the National Automobile Dealers' Association has prepared the following statement:

In approaching the subject, the dealer must bear in mind that there are two approved methods of inventorying his stock, and this applies equally to all stock, whether parts, accessories, tires and the like, new cars or used cars. For the purpose of distinguishing them, they are known as:

- (1) "Cost."
- (2) "Cost or Market, whichever is lower."

If the first method is adopted, a dealer should be able, without difficulty, to say what value should be placed opposite the listing of every article in his stock and when this "Cost" method is used the dealers seem to have had only two difficulties.

The point on which most inquiries have been made is whether or not, under either of the above methods of inventorying, depreciation can be charged against stock. The answer is NO. If the "Cost" method is used, an article must remain in the inventory at its actual cost until such time as it is disposed of in some manner, though it is, of course, allowable, when parts become so obsolete or accessories so shop worn or rotted, as in the case of tubes, to junk them and charge them off entirely.

The other question raised is with regard to the cost price of used cars taken in trade, and this has been the subject of considerable discussion. It is now settled, under the regulations, however, that the cost price of a used car taken in trade is the difference between the selling price of the new car and the cash received. The contention was unsuccessfully urged that the cost price of a used car was the difference between the cost price of the new car and the cash received, so that, if a new car, costing the dealer \$800, with a list price of \$1,000, was sold for \$500 cash, and a used car taken in, the cost of the used car to the dealer was the difference between \$800 and \$500, or \$300.

This method of calculating is not permitted, is wrong in theory and incidentally is the cause of the losses on

used cars. The regulations require using the example given above, that a profit of \$200 be entered in the books, and the cost of the used car entered in the inventories at \$500.

"Cost or Market" Method

Now with regard to the second method of inventorying, "Cost or Market, whichever is lower," this, in the opinion of the writer, is the method which should be used, for the reason that it truly reflects the condition of a dealer's business, though one method of inventorying must be consistently followed. This second method is best described by its name. In other words, the dealer puts each article in his inventory at its cost, if its market value is not lower than its cost, and the fact that its market value might be above its cost would not require the inventorying of the article at such enhanced value.

By this method obsolete parts and accessories can remain in the inventory at their true value, new cars having a value greater than their cost would appear at cost and used cars, while taken into the inventory at the difference between the selling price of the new car and the cash received in the transaction, would be immediately marked down to their actual net selling value.

Depreciation, as we have said, does not apply to stock of any kind, but market value can, has, does and will shrink and the second method of inventorying will always reflect the true worth of a business. The dealer does not have to say to his bank, "I have fifteen used cars that cost me \$10,000, which they may or may not be worth." He will say, "I have \$10,000 worth of used cars. He fools neither himself nor the bank and there are no awkward explanations, such as, "Well, yes, some of them may not be worth what they cost me, but I am carrying them at that, and my books won't show what my loss is until I sell them."

Determining Market Value

There is only one other point which has caused any great amount of difficulty and that is how the dealer is to arrive at the market value of a used car. If he has not some definite ideas as to the used car values, he won't have to worry about making income tax returns very long, though there is, of course, a wide margin in honest opinion. No two cars are identical. One dealer may realize more for used cars, because of his reputation for reconditioning them.

It therefore follows that "Market"

value when less than "Cost" must be fixed by the dealer in good faith, and while it is good business to figure your stock on a conservative basis, it is equally important that the field agent of the Internal Revenue Department does not find that the dealer is hiding his profits by figuring his used cars below their market value.

Some of the bitterest fights in the Internal Revenue Department have arisen on "Market" value, though in a comparatively recent one, at the request of the writer, the department not only agreed to consider as evidence of market value the figures given in the current "Chicago Used Car Market Report," but asked that a complete file of the Reports be furnished to the department for its reference, a request which was gladly complied with and was properly considered by the Chicago Automobile Trade Association as a high compliment to their fairness and accuracy.

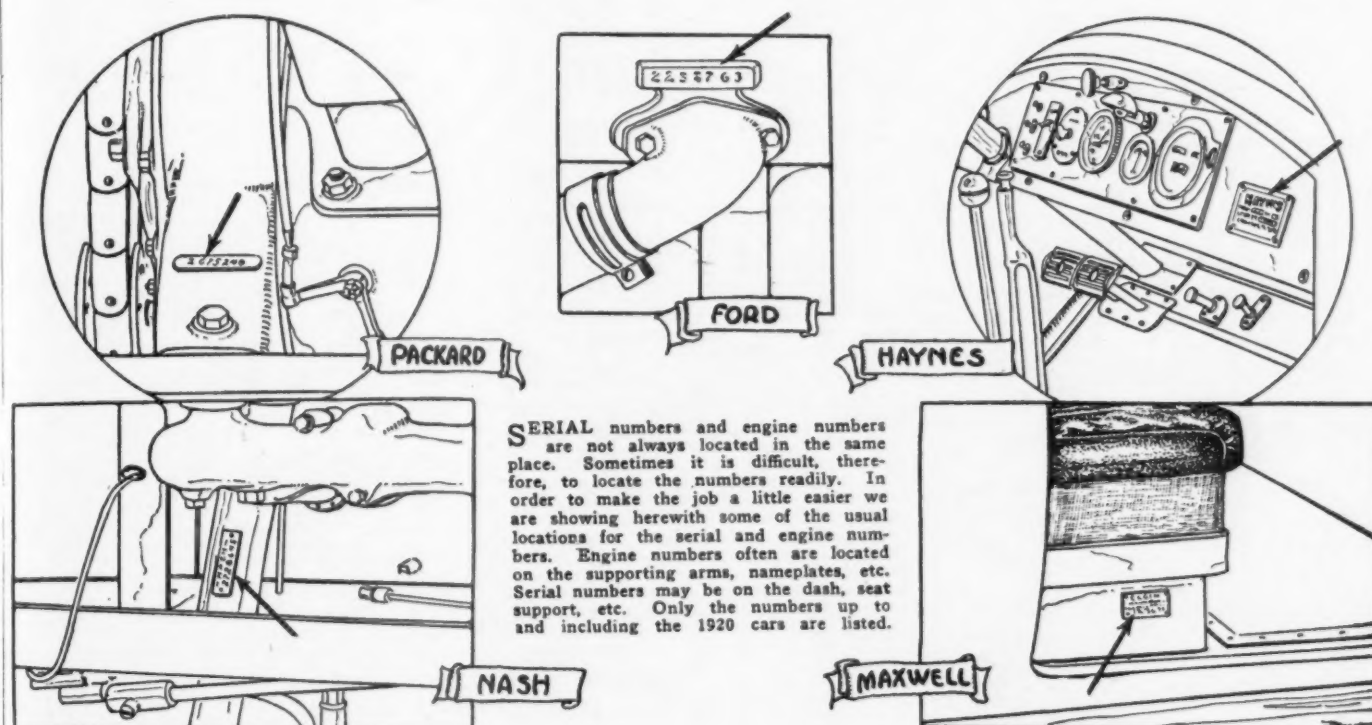
It is appreciated that your problem may have been omitted. If so, the association will be very glad to have you submit it for further consideration.

Buying Marks Interesting Dealers' Show at Rochester

ROCHESTER, N. Y., Jan. 22—Keen interest of patrons and many sales marked the fifteenth annual Rochester Automobile Show held in the exposition buildings here this week. Storms the first part of the week kept down the attendance, but surprisingly large numbers braved even the elements to attend the exhibition and these showed that they had come meaning business.

Only passenger cars and accessories were shown, owing to lack of space for properly displaying trucks. Sixty-eight dealers had their latest models on display and full corps of salesmen were kept busy answering questions and stressing the sales features of their particular automobiles. No particular sales stunts were employed, the quiet suggestive method with willingness to explain seemingly being most popular and effective.

In co-operation with the Rochester Automobile Club, which is just starting a free road service for members anywhere within a radius represented by ten counties, the Rochester Automobile Dealers' Association, sponsors of the show, added to the buying interest by offering a membership in the club with all privileges free to all who bought cars at the show.



SERIAL numbers and engine numbers are not always located in the same place. Sometimes it is difficult, therefore, to locate the numbers readily. In order to make the job a little easier we are showing herewith some of the usual locations for the serial and engine numbers. Engine numbers often are located on the supporting arms, nameplates, etc. Serial numbers may be on the dash, seat support, etc. Only the numbers up to and including the 1920 cars are listed.

Motor Age Passenger Car Serial Numbers

ACE	Model	Cyls.	Price	Serial Numbers
1920	L	6	\$2260	1001 to 1556
1921	G & H	6	2075	
	L	6	2260	
				Discontinued

ALLEN	Model	Cyls.	Price	Serial Numbers
1914	40	4	\$1395	2000-2753
1915	34	4	895	3499-5233
1916	37	4	795	6000-15631
1917	Classic	4	850	
1918	41	4	1095	18000-21000
1919	43	4	1395	
				Number stamped on front motor cross member
1920	43	4	1495	50001 and up
				Number stamped on frame at right front spring hanger
1921	Series 43	4	1385	
				Discontinued

AMERICAN	Model	Cyls.	Price	Serial Numbers
1917	A	6	1-250	
1918	B	6	\$1375	251-1000
1919	B	6	1865	1894-2378
1920	B-6	6	1865	
				Number on left side of motor
				Number on inside of dash under hood, left-hand side
1921	C6	6	2275	3000-4000
				Number on plate under seat

ANDERSON	Model	Cyls.	Price	Serial Numbers
1914	100-A	6	\$1295	1-250
1915	100-A	6	1345	
1916	200-A	6	1435	
1917	300-A	6	1550	
1918	400-A	6	1435	
1919	Series 30	6	1850	
1920	Series 30	6	1850	
				Number on plate under hood, right side dash
1920	30A-30G	6	1850	331-37272
1921	Series 40	6	1795	423-38129
				Numbers are arranged by body styles and do not run consecutively.

ARGONNE	Model	Cyls.	Price	Serial Numbers
1919	4	\$4750	....-110
1920	4	4750	2011 up
				Discontinued

APPERSON	Model	Cyls.	Price	Serial Numbers
1913	45	4	\$1600	4000-5999
	55	4	2000	
1914	45	4	1785	6000-8499
	45-58	6	2200	
1915	40	4	1350	8500-10500
	45	6	1485	
1916	6-16	6	1550	10501-12000
	8-16	8	1850	15000-16000
1917	6-17	6	1750	16001-17000
	8-17	8	2000	12000-13000
1918	6-18	6	17000 up	
	8-18	8	2550	
1919	8-19	8	2800	
	Anvay.	8	4000	18000-21000
1920	8-20	8	2950	
	Anvay.	8	4000	
				Number on right front engine leg
	8-20	8	3500	19000-21702
	Anvay.	8	4250	
				Number on right front side of crankcase
1921	8-21-S	8	3500	

AUSTIN	Model	Cyls.	Price	Serial Numbers
1914-15	66	6	\$4000	1400-6075
1915-16	77	6	6000	F012-F1045
1916-17	66	6	3600	C1003-C2862
1918	12-Cyl.	12	3750	C1003-C2862
				Discontinued
				Number on instrument board

AUBURN	Model	Cyls.	Price	Serial Numbers
1912	6-50	6	\$3000	
	40-N	..	1750	
				Numbers not by years nor in consecutive order
	40-H	..	1650	
	35-L	..	1400	
	30-L	..	1100	
1913	6-50	6	3000	
	6-45	6	2000	
	40-L	4	1650	
	37-L	4	1400	
	35-L	4	1400	
	33-L	4	1150	
1914	4-40	4	1490	
	4-41	4	1590	
	6-46	6	2100	
				Numbers on side body below front door
1915	4-36	4	1075	
	6-40	6	1500	
1916	6-38	6	1050	
	6-40A	6	1375	
	4-38	4	985	

AUBURN—Continued	Model	Cyls.	Price	Serial Numbers
1917	6-39	6	1145	
	6-44	6	1535	
1918	6-39-B	6	1345	
	6-44	6	1685	
1919	6-39H & 39K	6	1695	
				Number on floor board in front under cowl
1920	6-39	6	1795	22100 and up
				Number on end of seat, left side. The serial numbers of this car do not run consecutively or by years.
1921	6-39	6	1695	29725-33359
				33360-34116
				Number on footboard in driver's compartment

BEGGS	Model	Cyls.	Price	Serial Numbers
1918	18-T	6	\$1530	1018-1108
1919	19-T	6	1580	1019-11609
1920	20-T	6	1630	1020 and up
1921	20-T	6	1775	
				Number on front end of frame; engine number plate on left side of motor.

BIDDLE	Model	Cyls.	Price	Serial Numbers
1915	C	4	\$1700	C200-C299
				1700-
1916	D	4	1850	D300
1917	D	4	2275	D
1918	H	4	2750	H100-H1099
1919	H	4	2985	H1100-H1179
1920	B-1	4	3950	2000 up
	B-5	4	1500 up	
				Number on dash; engine number on upper left front crankcase.
	B-1	4	3950	2000 up
1921	B-1	4	3475	
				Number on right side of dash

BIRCH	Model	Cyls.	Price	Serial Numbers
1920	30-B	4	....	B-126 up
	40	4	....	42000 up
	45-B	6	....	N-151 up
				Number on name plate on dash
1921	Super 4	4	1345	
	Light 4	4	1195	
	Light 6	6	1595	
				Discontinued

BOUR-DAVIS	Model	Cyls.	Price	Serial Numbers
1916	17	6	\$1250	1-267
				Number on dash under hood; engine number on left side crankcase
1917	17-B	6	1500	1000-1022
				Number on top of seat frame under cushion

BOUR-DAVIS—Continued

Year	Model	Cyls.	Price	Serial Numbers
1918	18-B	6	\$1850	1100-1104
1919	....	....	....	1105-1134
Number on dash under hood. No record of 10 or 12 cars built by Shadburn Bros., Anderson, Ind.				
20	6	1700	1 up	
1920	20	6	1825	1-200
	21	6	2585	2000-2096
Number on front seat base opposite left hand door; engine number on left side crankcase				
Number on front seat near floor board				
1921	21-S	6	\$2385	
Discontinued				

BRADLEY

Year	Model	Cyls.	Price	Serial Numbers
1920	H	4	1400	up
Number under front seat, on dash and on bottom of all doors				
Discontinued				

BREWSTER

Year	Model	Cyls.	Price	Serial Numbers
1915	41	4	....	....
1916	41	4	....	41001-41242
1917	41	4	....	....
1918	41	4	....	....
1919	91	4	....	91242-91241
1920	41	4	\$9000	41242-41341
1921	91	4	7000	....
Number on plate screwed on the motor side of dash				
Serial numbers do not run in rotation				

BRISCOE

Year	Model	Cyls.	Price	Serial Numbers
1914-15	B-15	4	....	101-4000
1916	4-38 & 8-38	4	....	5001-8751
Number on front seat heel board				
4-24	4	....	15001-18846	
1917	4-24	4	....	18847-26604
1917-18	4-24	4	....	26605-34885
1919	4-24	4	....	34886-45786
1920	4-34	4	\$1185	M-550-M-558
				50000-57500
1921	4-34	4	1085	57500 and up
Number on Models B-15, 4-38 and 8-38 on front seat heel board; model 4-24 on dash				
Number on dash plate				
Name changes to Earl				

BROOK

Year	Model	Cyls.	Price	Serial Numbers
1920	S-20	2	\$395	1-1500
Number on front of timing gear housing				
1921	S-21A	2	\$395	
Discontinued				

BUICK

Year	Model	Cyls.	Price	Serial Numbers
1912	34-35	4	\$ 900	
	36	4	900	
	28-29	4	1025	
			1180	
	43	4	1725	
1913	24-25	4	950	
			1050	
	30-31	4	1125	
			1285	
	40	4	1650	
Number on rear cross frame member; engine number on left side of crankcase				
1914	B-24-25	4	\$ 950	
			1050	
	B-36-37	4	1235	
			1335	
	B-55	6	1985	
1915	C-25-24	4	900	100000-144715
			950	
	C-36-37	4	1185	
			1235	
	C-54-55	6	1635	
			1650	
1916	D-44-45	6	985	
			1020	144717-254501
	D-54-55	6	1450	
			1485	
1917	D-44-45-46	6	1040	
			1070	
			1440	254502-343782
	D-34-35-37	4	660	
			675	
	E-49	6	1385	
1918	E-4-34-35	4	795	
	E-6-44	6	1265	
	E-6-45-46	6	1265	
			1695	343783-480095
	E-6-49-50	6	1495	
			2175	
Number on left front side of frame member; engine number on left side crankcase				
1919	H-44-45	6	\$1495	
	H-46-47	6	1985	
			2195	480096 up
	H-49-50	6	1785	
			2585	
Number on rear end of left frame member; engine number on left side crankcase				
1920	K-44-50	6	\$1495	547524-689794
			1525	
1921	44-7	6	1735	
	48-50	6	1735	

CADILLAC

Year	Model	Cyls.	Price	Serial Numbers
1912	1912	4	\$1800	61006-75000
1913	1913	4	1975	75001-90018
1914	1914	4	1975	91005-99999
				(A1-A5008)
1915	Type 51	8	1975	A6000-A19001
1916	Type 53	8	2080	A20000-A38003
1917	Type 55	8	2080	
before Dec. 14, 1917 55-A1-55-S2				
\$2240				
after Dec. 14, 1917				
1918-19	Type 57	8	\$3220	57-A1-57-1000-57-TT-146
1920	Type 59	8	3490	59-A-1
Number on left front of engine in four-cylinder models. Number back of the right cylinder block on eights. For 1917 and 1918 the figures in front of letter indicate type of car, the number following letter the number of engine for that particular letter. There are 1000 numbers for each letter of the alphabet.				
1920	59-A	8	\$3490	59-A-1 to 59-V-636
1921	59	8	3490	59-A-1 to 61-A-1
Number stamped on the right rear corner of crank case at the rear of the right cylinder block. There are 1000 numbers for each letter of the alphabet; when all letters are used up double letters will be used.				

CAMPBELL

Year	Model	Cyls.	Price	Serial Numbers
1918	4	4	\$ 835	1-537
1919	C-4	4	1000	538 up
Number plate on left side of dash under hood				
Discontinued				

CARROLL

Year	Model	Cyls.	Price	Serial Numbers
1920	C	6	....	321-1 to 321-105
1921	C	6	\$3985	
	D	6	3185	
Serial number on dash				
Discontinued				

CRAWFORD

Year	Model	Cyls.	Price	Serial Numbers
1912	12-30	4	\$1600	
	12-40	4	2100	730-840
1913	13-30	4	1750	
	13-40	4	2100	841-926
1914	14-30	....	....	927-987
	14-40	4 & 6	1750	
1915	15-6-35	6	1850	
	15-40	....	2100	988-1090
1916	16-40	6	1650	1091-1195
1917	17-40	6	1750	1196-1234
1918	18-40	6	2250	1235-1294
1919	19-6-40	6	2500	1295-1337
1920	20-6-40	6	3000	1338 to 1650
1921	6-40	6	3000	
Number on seat next to door.				

CASE

Year	Model	Cyls.	Price	Serial Numbers
1912	M	4	\$2050	15000-16224
1913	N	4	1500	19001-20253
	O	4	2200	22001-22750
1914	O	4	2300	
	R	4	1250	22751-26333
	S	4	1850	
1915	R	4	1350	26334-28340
1916	T	4	1190	28341-31350
1917	T-17	4	1190	31351-32354
1918	U-18)	6	1875	32355-34856
	U-19)		2100	
1920	V	6	2650	34860 to 37287
1921	V	6	2650	37780-38744
Number on dash and on front cross bar of frame.				

CHALMERS

Year	Model	Cyls.	Price	Serial Numbers
1912	9	4	\$1400	18001-19252
	10	4	1800	20001-24000
	11	4	1500	27001-29166
	12	6	3250	24001-24300
	14	4	1750	4901-4950
1913	16	4	1600	24301-25300
	17	4	1950	29500-33499
	18	6	2400	25301-27000
1914	24	6	2175	34500-38499
1915	26-A	6	1800	
	26-B	6	1850	
			Aug. 1, 1914	38600-44999
			Sept. 1, 1914	1650
	26-C	6	1550	45000-45799
	29	6	2400	45801-47300
Numbers from here on are by models and not by year.				
	32-A	6	\$1400	47500-49599
			July 1, 1915	2175
	32-B	6	1350	
			Aug. 1, 1915	1450
			April 1, 1916	1350
	35-A	6	1050	55700-75699
			April 20, 1916	1090
	35-B	6	1280	
			Jan. 1, 1917	1350
			Nov. 1, 1917	1450
			Nov. 24, 1917	1535
			April 8, 1918	1615
	35-B	6	1765	
			July 12, 1919	1765
	35-C	6	1250	
			Nov. 1, 1917	1365
			Nov. 24, 1917	1485
			April 8, 1918	1565
			July 12, 1919	1685
Number on 1915-16 models on left frame member under front boards. Number on 1916-17-18-19 models on left front horn of frame.				

CHALMERS—Continued

Year	Model	Cyls.	Price	Serial Numbers
1920	Roadster	6	\$1795	94001 to 110000
				111101 to 112000
	5-Passenger	6	1795	115001 to 200000
	7-Passenger	6	1945	200001 and up
	Sport	6	1995	115001 to 200000
	Coupe	6	2595	115001 to 200000
	Sedan	6	2745	111101 to 112000
				114001 to 114101
1921	6-30	6	1545	
Number on brass plate on left horn of frame just in front of radiator.				
CHAMPION (Formerly Direct Drive)				
Year	Model	Cyls.	Price	Serial Numbers
1918	....	4	....	101-113 demonstrating models only
1919	C & CS	4	\$1150	C-100—C-216
1920	C-4	4	....	C-300 up
Number plate on body under seat.				
1920	Touring	4	\$1350	100 to 299
1921	Tourist	4	1250	C200—C299
	Special	4	1595	C8200—C8299
Number on inside dash on instrument board.				

CHANDLER

Year	Model	Cyls.	Price	Serial Numbers
1913	14	6	\$1785	1-550
1914	15	6	1785	551-250
1915	15-B	6	1295	2501-4000
1916	16	6	1295	4001-15000
1917	17	6	1295	15001-35000
1918	New Series	6	....	35001-65000
1919	New Series	6	....	65001 up
1920	New Series	6	1895	
Number on right front engine arm up to car number 72000; cars numbered above 72000 the number is on frame under right headlight and fender.				
1921	6	6	\$1785	
Chandler cars are not listed by serial numbers for each year, but are classed as new series of the current model.				

CHEVROLET

Year	Model	Cyls.	Price	Serial Numbers
1913	C	6	\$2100	
1914	H-2	4	750	
	H-4	4	875	
	L	6	1475	
	C	6	2500	
1915	H-2	4	750	
	H-4	4	875	
	L	6	1425	
1916	490	4	490	
	H-4	4	750	
1917	490	4	490	
	F-5	4	800	
	D-5	8	1385	
1918	490	4	635	
	FA-5	4	935	
	D-4	8	1385	
	D-5	8	1385	
1919	FA-5	4	1045	
	D-4	8	1385	
	D-5	8	1385	
	FB-5	4	1135	
	490	4	735	
1920	FB-50	4	1135	
	490	4	735	
	T	4	1460	1-2284 to 1-4199 2-2202 to 2-36617 3-1301 to 3-1952 6-1645 to 6-2362 9-356 to 9-847
	FB Touring	4	1295	1-9385 to 1-20516
	FB Roadster	4	1270	2-4739 to 2-11448
	FB Sedan and Coupe	4	1855	3-54 to 3-1500 6-1290 to 6-4990 9-1336 to 9-4604
	490 Roadster	4	775	1-92475 to 1-A-20160
	490 Touring	4	795	2-90422 to 2-A-23673
	490 Coupe	4	1170	3-47101 to 3-70100
	490 Sedan	4	1245	6-36885 to 6-51094 7-25430 to 7-34200 9-28154 to 9-40225
1921	490	4	645	
	FB	4	1185	

COLE

Year	Model	Cyls.	Price	Serial Numbers
1912	Large 4	4	.....	5000 to 7000
	Small 4	4	.....	5000-7000
1913	4-40	4	.....	9000-10000
	4-50	4	.....	7000-9000
	60-Big 6	6	.....	10000-11000
1914	Series 9	4	.....	16000-17012
	Series 9	6	.....	14000-15000
1915	660	6	.....	15000-15175
	666	6	.....	15175-16000
	Series 10	4	.....	18000-20000
	Little 6	6	.....	20000-22000
	440	4	.....	22000-23000
	650	6	.....	23000-24000
	Sensible 6	6	.....	24000-25000
	651, Little 6	6	.....	27000-30000
1916	850	8	.....	15175-16000
	666, Big 6	6	.....	30000-40000
	860	8	.....	40000-50000
1917	Series 30	8	.....	50000-59478
	870	8	.....	59389 up
1918	870	8	.....	59389 up
1919	870	8	.....	59389 up
1920	870	8	.....	59389 up
	870	8	.....	59389 up
	871	8	.....	59389 up
	872	8	.....	59389 up
	878	8	.....	59389 up
	879	8	.....	59389 up
	883	8	.....	59389 up
	884	8	.....	59389 up
	885	8	.....	59389 up
1921	890	8	.....	59389 up

Number on right front spring hanger and on under right front seat cushion.

COLUMBIA

Year	Model	Cyls.	Price	Serial Numbers
1917	A	6	.....	1250 501-1310
	B	6	.....	1345 1-297
1918	C	6	.....	1350 2000-3199
	D	6	.....	1450 501-889
1919	C-S	6	.....	2445 1850-1950
	C	6	.....	1600 3201-3389
	D	6	.....	1745 1000-1132
	E	6	.....	1845 101 up
	H	6	.....	2850 100 up
1920	C-S	6	.....	2445 1951-1968
	C	6	.....	1695 4000 and up
	D	6	.....	1845 1400 and up
	E-CS	6	.....	2850 2000 and up
	H	6	.....	100 and up
1921	E-CS-H	6	.....	10000 and up
	DC & CS	7	.....	1795 10000-20000

Number on upper toe board

COMET

Year	Model	Cyls.	Price	Serial Numbers
1917-18	C-51	6	.....	1-500
1919	C-52	6	.....	500 up
1920	C-53	6	.....	\$2150 701 and up
1921	C-53	6	.....	2450

Number under hood on dash, left side

COMMONWEALTH

Year	Model	Cyls.	Price	Serial Numbers
1913	38	4	.....	\$ 975 A1000-A1366
1914	38	4	.....	975 B203-A411
	20	4	.....	495 B001-B174
1915	38	4	.....	1075 A966-B36
	20	4	.....	495 C195-CX17
1916	32	4	.....	895 CX2-C194
1917	40	4	.....	995 D219-D479
1918	40	4	.....	995 DX732-DO883
1919	40	4	.....	1395 41999
1920	42	4	.....	1395 42000 to 44000
1921	44	4	.....	1595

Number plate on cowl

CROW-ELKHART

Year	Model	Cyls.	Price	Serial Numbers
1914	D-45	4	.....	\$1245
	D-55	4	.....	1650 6000-6500
	D-56	4	.....	1650
1915	E-45	4	.....	1145
	E-65	6	.....	2250 6501-7200
	E-66	6	.....	2350
	E-25	4	.....	725
1916	CE-30	4	.....	725 7201-9025
	CE-33	4	.....	795
1917	CE-33	4	.....	935 9026-13295
	CE-35	4	.....	845
	CE-32-34	4	.....	995 13296-15292
1919	CE-32-34	4	.....	1095
	H-42-44	4	.....	1355 15293-17411
	H-46	6	.....	1545
1920	S-65-64-63-67	6	.....	1745 18900 to 19330
	L-65-64-63	4	.....	1495 18901 to 19333
1921	S-63-65	4	.....	1295
	S-63-65	6	.....	1545

Number on seat frame under front cushion

CUNNINGHAM

Year	Model	Cyls.	Price	Serial Numbers
1912	J	4	.....	181-305
1913	M	4	.....	306-455
1914	R	4	.....	456-755
1915	S	4	.....	756-990

CUNNINGHAM—Continued

Year	Model	Cyls.	Price	Serial Numbers
1916	V-1	8	.....	991-1297
1917	V-2	8	.....	1298-1597
1918-19	V-3	8	.....	1601-2300
1920	V-3	8	.....	2451 to 3000
1921	V-4	8	.....

Number on left frame member near radiator

DAVIS

Year	Model	Cyls.	Price	Serial Numbers
1912	40	4	.....	\$1850 Contin'tl C, 101-1800
1913	40	4	.....	2000 Contin'tl C, 1801-4270
	50	4	.....	2100 Contin'tl E, 4186-7569
1914	35	4	.....	1335 Contin'tl 4N, 111-874
	Six-50	6	.....	2150 Contin'tl 6P, 1023-2920
1915	38	4	.....	1235 Contin'tl 4N, 1175-7082
	Six-50	6	.....	2150 Contin'tl 6P, 1023-2920
1916	Six-F & G	6	.....	1095 Contin'tl 7W, 1005-17650
	Six-E	6	.....	1495 Contin'tl 6N, 1719-8693
1917	Six-H, I	6	.....	1195 Contin'tl 7W, 17651-67452
	Six-K	6	.....	1795 Contin'tl 7W, 17651-67452
	Six-J	6	.....	1495 Contin'tl 7N, 14582-30983
1918	Six-H, I, L	6	.....	1495 Contin'tl 7W, 5001-5600
	Six-K	6	.....	1850 Contin'tl 7W, 5001-5600
1919	Six-H, I, L	6	.....	1685
	Six-N & P	6	.....	2300 5001-6000
	Six-J, M	6	.....	2050
1920	51	6	.....	\$2185
	52	6	.....	2225
	53	6	.....	2350
	54	6	.....	3185 6001 to 7885
	55	6	.....	3185
	56	6	.....	2225
	57	6	.....	2350
1921	D-19	8	.....	5350 6001X to 8549

Number on left side of crankcase

DANIELS

Year	Model	Cyls.	Price	Serial Numbers
1916	A	8	.....	103-257
1917	A	8	.....	258-302
	B	8	.....	401-560
1918	A	8	.....	361-383
	B	8	.....	561-741
1919	B	8	.....	742-873
1920	D	8	.....	\$4500 1100 and up
	C	8	.....	1000 and up
1921	D-19	8	.....	\$5350 1100-1799

Number on top of front gear case cover; engine number on crankcase near distributor.

DETROITER

Year	Model	Cyls.	Price	Serial Numbers
1916	F	4	.....	\$ 985 15000-20000
	6-45	6	.....	1098
1917	6-45	6	.....	1195 20000 up

Discontinued. Number on dash plate

DIRECT DRIVE—See Champion**DISPATCH**

Year	Model	Cyls.	Price	Serial Numbers
1920	D-G-1	4	.....	\$1350 B-20-1 and up
	H-E	4	.....	B-20-1 and up

Discontinued

DIXIE FLYER

Year	Model	Cyls.	Price	Serial Numbers
1916	L	4	.....	\$ 795 Under 2200
1917	L-X	4	.....	885 2200-3500
1918	L-S	4	.....	995
		4	.....	1095 3500-5000
1919	H-S-50	4	.....	1365 5000 up
1920	H-S-50	4	.....	1465 7001 to 11000
1921	H	4	.....	\$1445 9000-10300

Number on dash at left hand spring horn

DODGE

Year	Model	Cyls.	Price	Serial Numbers
1914-14 to 10-31-17		4	.....	1-200000
8-18-15 to 2-1-18		4	.....	25000-225000
2-9-16 to 4-26-18		4	.....	50000-250000
6-15-16 to 8-8-18		4	.....	75000-275000
10-23-16 to 12-13-18		4	.....	100000-300000
2-17-17 to 3-19-19		4	.....	125000-325000
5-1-17 to 3-19-19		4	.....	150000-250000
8-3-17		4	.....	175000-275000
1920	Touring	4	.....	\$1185
	Roadster	4	.....	1185 423641 to 569548
	Sedan	4	.....	2000
	Coupe	4	.....	1850
1921		4	.....	985 569549 to 663096

Number stamped on frame under floor board; engine number on left side just above carburetor.

DORRIS

Year	Model	Cyls.	Price	Serial Numbers
1912	G	4	.....	\$2500 3001-3255
1913	H	4	.....	2500 5001-5281
1914	I	4	.....	2500 6001-6110
1915	I-A-4	4	.....	2250 6111-6220
1916	I-A-6	6	.....	2475 8001-8140
1917	I-B-6	6	.....	2475 8141-8289

Number on front end crankshaft

DORRIS—Continued

Year	Model	Cyls.	Price	Serial Numbers
1918	I-C-6	6	.....	2985 8300-8392
1919	6-80	6	.....	4350 8401-8658
1920	6-80	6	.....	4350/8675 to 9000
1921	6-80	6	.....	4785 9017 to 9088

Serial number on top of crankcase

DORT

Year	Model	Cyls.	Price	Serial Numbers
1915	M-4	4	.....	\$ 540
	M-5	4	.....	680
1916	M-5A	4	.....	725
1917	M-6	4	.....	695
	M-9	4	.....	9204-24368
	M-9S	4	.....	1065 Up to Feb. 21, 1918
	M-9T	4	.....	815
1918-19	M-8	4	.....	865
	M-8C	4	.....	1265
	M-11	4	.....	865 24369-49330
	M-11S	4	.....	1265 Up to Oct. 4, 1918
	M-11T	4	.....	1000
1920	M-15	4	.....	985
	M-15S	4	.....	1535 49331 up
	M-10	4	.....	985
	M-10C	4	.....	1535

Number on frame under left head lamp, also on shroud board

Starting number Nov. 1919. Ending Nov. 1920.

Number on dash under hood.

Number on plate on dash

DUPONT

Year	Model	Cyls.	Price	Serial Numbers
1921	A	4	.....	3400

Serial numbers do not run consecutively

DURANT

Year	Model	Cyls.	Price	Serial Numbers
1921	A-22	4	.....	890 1 to 2325

Number on right side of dash under hood

ESSEX

Year	Model	Cyls.	Price	Serial Numbers
1918			.....	A-5000, A-34999
			.....	A-35000, A-39999
1919	A	4	.....	\$1595 5000-25000
			.....	1595 60000-63000
			.....	2250 70000-75004
1920	5-A to 7-A	4	.....	5000 to 52999
	5-A to 7-A	4	.....	53000 to 59999
	5-A to 7-A	4	.....	6000 to 68999
	5-A to 7-A	4	.....	69000 to 69999
	5-A to 7-A	4	.....	70000 to 83999
	5-A to 7-A	4	.....	84000 to 84999
	5-A to 7-A	4	.....	85000 to 89499
	5-A to 7-A	4	.....	89500 to 89999
	5-A to 7-A	4	.....	90000 to 94999
	5-A to 7-A	4	.....	95000 to 99999
	5-A to 7-A	4	.....	100000 to 104999

EMPIRE Year Model Cyls. Price Serial Numbers 1913-14 31 4 \$ 850 315750-318672 1914 31-40 4 900 405101-406190 1915 35 4 975 331001-333300 1916 40 4 975 401001-401675 1916-17 45 4 935 451001-452603 60 6 1095 601001-603412 1917-18 50 4 1125 50001 up 70 6 1345 70001-70350 70-A 6 1375 70A001-70A710 73 6 1360 73001-73059 Discontinued Number on heel board of front seat				
F. R. P. Year Model Cyls. Price Serial Numbers 1914 A-45 and B 4 \$7000 1-100 1915 A-45 and B 4 7000 1-100 1916 A-45 and B 4 7000 1-100 1917 A-45 and B 4 7000 1-100 1918 B-45 4 Name changed to Porter				
FORD Year Model Cyls. Price Serial Numbers 10-1-12-9-30-13 4 \$ 690 15001-332500 10-1-13-7-31-14 4 332501-339000 8-1-14-7-31-15 4 339001-355500 8-1-15-7-31-16 4 355501-362200 8-1-16-7-31-17 4 362201-2113500 8-1-17-7-31-18 4 2113501-2756251 8-1-18-7-31-19 4 2756252-3277851 8-1-19-9-30-19 4 3277852-3429400 1920 4 525 3659971 to 4698420 1-1-21-12-3-21 4 510 4698421 to 5638071 Number stamped on left side cylinder block just above water inlet compression. Car and engine number the same from May 1, 1915.				
FRANKLIN Year Model Cyls. Price Serial Numbers 1912 G (Ser. 1) 4 12801-13180 D (Ser. 1) 6 14401-14627 H (Ser. 1) 6 9601-9660 M (Ser. 1) 6 15201-15411 GRbt.Ser.1 6 17001-17169 1913 G (Ser. 2) 4 13181-13329 D (Ser. 2) 6 14628-14657 H (Ser. 2) 6 9661-9687 DTorp.Ser.2 6 14901-14921 M (Ser. 2) 6 15412-15640 K (Ser. 2) 6 10118-10204 O (Ser. 2) 6 16003-16025 GRbt.Ser.2 6 17170-17218 M (Ser. 2) 6 15641-16215 and 18001-18105 D (Ser. 3) 6 14658-14812 H (Ser. 3) 6 9688-9752 and 9801-9815 DTorp.Ser.3 6 14922-14975 M (Ser. 4) 6 16216-16894 and 18106-18205 1914 M (Ser. 4) 6 16861-16894 and 18189-18205 M (Ser. 5) 16895-17000 and 19000-19510 1915 M (Ser. 6) 19511-20643 and 18311-18527 M (Ser. 7) 20644-21980 and 18528-18658 1916 M (Ser. 8) 21981-25234 and 18654-19000 A (Ser. 9) 26001-26175 and 40001-59572 and 90001-100000 27001-28387 1917 B (Ser. 9) 29001 up 1918 S-9B Touring 6 \$2850 68900 to 73476 1919 Sedan 6 3950 93852 to 95000 Sedan 6 3950 95052 to 96500 Sedan 6 3950 99101 to 99999 Sedan 6 3950 80001 to 8345 Brom. 6 3900 97371 to 98604 4-Pass 6 2850 41779 to 42427 2-Pass 6 2800 29843 to 30134 Demi-Coupe 6 39101 to 39109 Demi-Sedan 6 39500 to 39501 1921 9-B 6 2650 100000 and up Number on rear sill of body				
GARDNER Year Model Cyls. Price Serial Numbers 1920 G 4 \$1125 1000 and up 1921 TRG 4 955 6498-10001 Number on right hand side under front cushion				
GERONIMO Year Model Cyls. Price Serial Numbers 1918 6A-45 6 \$1550 400-500 1919 6A-45 6 1550 501-650 Number on front of cowl Discontinued				
GLIDE Year Model Cyls. Price Serial Numbers 1913 45 4 \$2150 1300-1400 1914 36 4 1890 5100-5600 1915 30 4 1195 7000-7600 1916 Lt. Six 40 6 1095 9000-9500 1917 Lt. Six 40 6 1125 9501-10000 1918 Lt. Six 40 6 1655 10001-10555 Discontinued				
Numbers on models up to 10000 on name plate inside channel of the front frame horn. Number on cars from 10000 to 10555 on instrument board.				
GRANT Year Model Cyls. Price Serial Numbers 1914 M 4 \$ 495 0-3033 1915 T 6 750 5000-7053 1916 V 6 795 10000-14002 1917 K 6 825 15000-27000 1918 G 6 1055 30001-40001 1919 6 1120 1920 H 6 1550 50001 and up HY 6 1550 51700 and up HX 6 1785 51300 and up 1921 6 6 1550 Number on dash under hood				
H. C. S. Year Model Cyls. Price Serial Numbers 1920 2 4 \$2975 1-550 1921 3 4 2475 601-1419 Number on dash and on cross member of frame				
HACKETT (Name changed to Lorraine in December, 1919) Year Model Cyls. Price Serial Numbers 1917 5-pass 4 \$ 885 50-501 1918 5-pass 4 985 534-594 1919 5-pass 4 1125 601-694 Number on dash under hood, and on end of frame				
HAL Year Model Cyls. Price Serial Numbers 1916 12 12 \$2100 Can be distinguished by straight windshields and carpet paneling on back of front seat. 12 12 2385 Introduced September, 1916. Can be recognized by walnut paneling on front seat back. 1917 12 12 2600 A new pocket-style tire carrier is fitted. 1918 25 12 3600 Discontinued				
HALLADAY Year Model Cyls. Price Serial Numbers 1920 20 6 \$1885 20001-20999 1921 21 6 1985 Number on dash				
HANSON Year Model Cyls. Price Serial Numbers 1918 A-45 6 \$1685 1001-1025 1919 A-45 6 1685 1026-1025 1920 6 1700 up Number on right side heel board under front seat; engine numbers left side crank case. 1921 54-T 6 2395 to 2530 60-S 6 \$2285 4500 to 4615 Number on left front seat riser				
HARROUN Year Model Cyls. Price Serial Numbers 1917 A-A-1 4 \$ 695 101-549 1918 A-A-1 4 895 550-2381 1919 A-A-1 4 995 2382-2624 1921 A-A-2 4 1195 Number plate on right side front seat, under cushion Discontinued				
HATFIELD Year Model Cyls. Price Serial Numbers 1919 A-42 4 678 1920 A-42 4 700 up 1921 A-42 4 \$1495				
HAYNES Year Model Cyls. Price Serial Numbers 1912 A-21 4 \$2100 B-21 4 2450 C-21 4 2750 AY 4 3000 3036-4851 Y 4 3800 22 4 3900 24 4 2250-2750 1913 22 4 3400-3500 23 6 2500 5000-6550 24 4 1785 25 6 2700 1914 26 6 2700-3200 27 6 2785-6601-8499 28 4 1985-3830 28 4 2700 1915 32 4 1660-2500 30 6 1485 8552-10949 31 6 2250-3000 33 6 1550 1916 34 6 1385 34 6 1485 35 6 1495 37 6 1725-10951-15999 36 6 2250-1595-1750-2150 41 12 2225-2890 40 12 2095-2700				
HAYNES—Continued 1917 36 6 \$1595-2260 16002 up 37 6 1725-2390 1918 38-39 6 2150-3250 29650 up 44 12 2910-3985 21000-24000 1919-20 45 6 2685-4200 32894 up 46 12 3450-4200 21364 up Number plate on cowl at extreme right; also on timing gear housing. 1920 47 6 38000 and up Number on dash. 1921 48 12 \$3635 55 6 1985 46000 to 50700 75 6 2395 75500 to 76800 Number between cylinder block and radiator on crankcase				
HOLLIER Year Model Cyls. Price Serial Numbers 1915 158T 8 \$ 985 1-580 158R 8 985 1-60 1916 168T 8 985 580-623 1917 176T 6 1085 1-35 176R 6 1085 1-35 178R 8 1185 1-51 1918 186T 6 1185 188T 8 1385 6194-7010 1919 206T 6 1785 10001-10083 1920 206B 6 1985 10083 up Number on heel board of front seat Discontinued				
Howard—See Lexington				
HOLMES Year Model Cyls. Price Serial Numbers 1918 1 6 \$2900 1-500 1919 2 6 2900 500 up 1920 3 Touring 6 3350 3 Roadster 6 19851 to 40000 3 Sedan 6 3 Coupe 6 1921 Series 4 6 3350 Number on right side rear end of frame				
HUDSON Year Model Cyls. Price Serial Numbers 1912 33 4 15001-30000 1913 37 4 30001-56500 1914 54 6 56501-61700 40 6 63001-77201 1915 40 4 73501-90000 54 6 59001-62000 1916 40 4 G10001-G40000 1917 H 6 H1-H99999 J 6 1-96499 4J 6 75000-97999 1918 M 6 5000-97499 1919 O 6 5000-90999 Numbers on all cars in right hand frame. Also on left side dash under hood. Cars not designated by yearly models but by a prefix letter such as H, J, M, O. 1920* O 6 \$2600 5000 to 364999 O 6 370000 to 389999 1921* Super 6 6 2250 400000 to 499999 *These numbers effective December 1, respectively.				
HUFFMAN Year Model Cyls. Price Serial Numbers 1919 W 6 \$1795 1920 R 6 1995 1776 to 2814 1921 R 6 \$1795 2135 and up Number on left front frame horn				
HUPMOBILE Year Model Cyls. Price Serial Numbers 1912 16-20 4 \$ 750 20 4 900 25001-28902 1913 20 4 750 H 4 {1000} {1100} 28903-40000 1914 H-A 4 1200 32 4 1050 40001-52000 Number on sector plate center of dash 1915 K 4 \$1200 52001-60000 N 4 1085 1916 N 4 1185 N U 4 1340 1917 N 4 1285 60000-87519 N U 4 1440 N 4 1385 N U 4 1540 Number plate on dash near speedometer 1918 R 4 {1250} {1350} R1-R15000 1919 R 4 1335 R3 4 1450 R20001 up Number plate on dash at steering column 1920 R-3 4 \$1685 29000 to 30000 R-4 4 1685 30001 to 39999 R-5 4 1685 40000 and up Number on plate inside cowl 1921 R 4 \$1485 47500-61100 Number on plate where steering column joins dash				
INTER STATE Year Model Cyls. Price Serial Numbers 1912 30-32 4 \$1750 40-41-42 4 2400 4101-6000 50-51-52 4 3400				

INTER STATE—Continued

Year	Model	Cyls.	Price	Serial Numbers
1913	45	6	\$2750	
1914	T	4	1000	6001-7099
1915	T	4	1000	7100-11503
1916	T	4	850	11504-14528
1917	T	4	850	14529-19108
1918	T	4	1000	19109 up

Discontinued. Number plate under front seat

JACKSON

Year	Model	Cyls.	Price	Serial Numbers
1912	26-27-28	4	\$1100	
	32-32AC	4	1650	
	36	4	1500	
	42 and 45	4	1800	
	52	4	1100	
	32-Special	4	1500	
1913	33	4	1850	
	43	6	2150	
	53	6	2300	
1914	33	4	1500	
	43	4	1850	
	53	6	2150	
1915	44	4	1135	
	48	6	1650	
1916	34	4	985	
	46	4	1375	
	348	8	1195	
	68	8	1685	
1917	34-A	4	985	
	348-A	8	1195	
	68-A	8	1685	
	349	8	1295	
	350	8	1195	
1918	349	8	1495	
			2195	

Numbers do not run consecutively.

Number plate on dash or on front seat heel board

1920. 6-38 6 \$2150 25000 to 27842

1921. 6-38 6 1950

Number on end of front seat

JEFFERY

Year	Model	Cyls.	Price	Serial Numbers
1913	42 H. P.	4	\$1700	31551-35999
1914	38	4	1550	40000-46999
	48	6	2250	38000-38999
1915	Six	6	1650	47000-53999
1916	4-62	4	1000	57000-60500
	6	6	1350	68000-69500
1917	472	4	1095	61600-78000
	671	6	1465	86000-96000

For later models see Nash

Number to left of front frame cross member

JONES

Year	Model	Cyls.	Price	Serial Numbers
1915	1915	6	....	1-1999
1916	1916	6	....	2000-2999
1917	26-A	6	....	3000-5000
	26-B	6	....
1918	27-A	6	....	5001-6000
	27-B	6	....
	27-C	6	....
	27-D	6	....
1919-20	27-A	6	....
	27-B	6	....
	27-C	6	....	6001 up
	27-D	6	....
	27-E	6	....

Number under the hood, on right side of cowl board, and stamped on ends of both front spring hangers.

Discontinued

JORDAN

Year	Model	Cyls.	Price	Serial Numbers
1917	60	6	\$1650	151-2157
1918	60	6	1995	2157-5298
1919	F	6	2775	5401 up
1920	M	6	2450	10001 up
1921	M	6	2250	

Number under hood

KELSEY

Year	Model	Cyls.	Price	Serial Number
1921	GWOV	6	\$1800	102-110

Number on left hand side of instrument board

KING

Year	Model	Cyls.	Price	Serial Numbers
1912	36	4	\$1565	100-550
1913	A	4	1350	600-999
1914	B	4	1095	1000-2200
1915	C	4	1150	2201-3005
	D	8	1350	
1916	E	8	1585	12000-14950
	EE 1st Ser.	8	1650	16000-17800
1917	EE 2d Ser.	8	1650	18000-18099
1918	F	8	2150	20001-25000
1919	G	8	2350	30001-30629, 32976, 36378, 35022
1920	H	8	....	H-1, H-2001, H-4001 and H-5001 up

Numbers on dash plate, except 1915 models, which are on heel board under front seat.

1920. Touring 8 \$.... 1000 to 2000

Foursome 8 2001 to 4000

Road King 8 4001 to 5000

Limousine 8 5001 to 6000

1921. J 8 2725 JT1001 & KF3001

Number below cushion on heel board

KISSEL KAR

Year	Model	Cyls.	Price	Serial Numbers
1912	30	4	\$1500	3001-4000
	40	4	1850	7001-7400
	50	4	2350	6001-6300
1913	L D 13	4	1700	10500
	H 13	4	2000	7401-10000
	D 13	4	2500	6301-7000
1914	40	4	1850	15001-15601
	48	6	2350	20001-30000
	60	6	3150	4601-6000
1915	4-36	4	1450	16001-16575
	6-42	6	1850	25001-25455
1916	32-4	4	1050	30001-33001
	36-4	4	1250	16576-20000
	42-6	6	1485	25456
1917	100 pt. 6	6	1195	38-101 up
	Double 6	12	2250	12-101 up
1918	100 pt. 6	6	1495	
	Double 6	12	2250	
1919	Cus. Bld.	6	2875	45-101 up
	Cus. Bld.	6	2450	45-200 up
1920	Cus. Bld.	6	3475	
1921	45	6	3475	

Number plate on dash under hood. On models built since 1915 car number stamped on front end right frame member adjacent to right head lamp. Engine number on right front motor arm. Numbers are not given in years as the numbers do not close one year to begin another.

KLINE

Year	Model	Cyls.	Price	Serial Numbers
1915	6-42A	6	\$1750	2100-2500
1916	6-36E	6	1095	3000-3599
1917	6-38F	6	1295	3600-4500
	6-38G	6	1395	4600-4999
1918	6-38GA	6	1495	5000-5800
1919	6-42	6	1865	6000-7000
1919-20	6-55-J	6	1965	7000 to 7999
			2290	7000 to 7999
1921	55-K	6	2290	

Number plate on right front seat floor board

LEACH

Year	Model	Cyls.	Price	Serial Numbers
1921	999	6	\$5200	8000 to 975

On instrument under hood

LAFAYETTE

Year	Model	Cyls.	Price	Serial Numbers
1920	8	8	\$5625	1001 and up
1922	134	8	4850	

Number on front floor board

LEXINGTON (Formerly Howard)

Year	Model	Cyls.	Price	Serial Numbers
1913	D-F	4	\$1750	
	G	6	2500	
				Number plate on tonneau floor board
1914	4-H	4	\$1335	
	4-K	4	1375	
	6-L	6	1875	
	6-M	6	2575	
1916	6-N	6	1875	
				Number plate on dash, right side, under hood
	6-O-16	6	\$1075	
1917	6-O-17	6	1185	
			1285	
				Number plate on dash, right side under hood, and on top of fly-wheel housing.
	6-P	6	\$2875	
				Number plate on dash, right side under hood
1918	O	6	\$1345	
	R	6	1585	
			1685	
				Number plate on dash, right side under hood, left front spring and on left rear kick-up.
1919	R-19	6	\$1785	17296
1920	S	6	1885	18001 up
1921	S	6	1885	19001 and up
	T	6	2785	30001 and up

Number plate on dash, right side under hood, on left front spring crown, left rear motor arm, and on right side of rear side rail.

Number on right front spring hanger.

LENOX

Year	Model	Cyls.	Price	Serial Numbers
1912	AB BB			
	CB DB	4	\$1800	100-215
1913	AC DC	4	2000	1000-2000
	MC	6	2750	15-1525
1914	A D	4	2000	2000-2015
	M	6	2465	1525-1550
1915	A1 D1	4	2000	2015
	M1	6	2465	1551-1563
1916	O	6	2500	2500
1917	O	6	2510	2530
1918	Ser. 33	6	2550	2554

Discontinued

LIBERTY

Year	Model	Cyls.	Price	Serial Numbers
1916	10-A	6	\$1095	30501-31500
1917	10-B	6	1195	31501-33500 approx.
1918	10-B	6	....	33501-36450
1919	10-B	6	....	36451-42250
1920	10-C	6	1985	50500 up

Numbers on left side front frame end; motor numbers, 21001 to 27001, on left side of motor.

1921. 10-C 6 \$1795 54000-56000

Number on left side frame channel just ahead of radiator

LINCOLN

Year	Model	Cyls.	Price	Serial Numbers
1920	8	\$4600	1 and up
1921	8	4300	835-3151

Number on front of dash on right side

LOCOMOBILE

Year	Model	Cyls.	Price	Serial Numbers
1912	L	4	\$3500	
	M	4	4800	
1913	L	4	3600	
	R	6	4400	
	M	6	5100	
1914	38 RD & LD	6	4400	
	48 RD & LD	6	5100	
1915	38R-5	6	4400	
	48M-5	6	5100	(Decline to give serial numbers)
1916	38	6	4400	
	48	6	5100	
1917	38	6	4600	
	48	6	4600	
1918	38	6	5000	
	48	6	5950	
1919	38	6	....
	48	6	....
1920	38	6	....
	48	6	8100	17001 and up
1921	....	6	8600	

Number on right side of dash column

LORRAINE (Previous to 1920, see Hackett)

Year	Model	Cyls.	Price	Serial Numbers
1920	20T	4	\$1575	999 to 1999
				Number on dash
1921	21T	4	\$1665	999 and up

Discontinued

MAIBOHM

Year	Model	Cyls.	Price	Serial Numbers
1917	A	4	\$ 830	1-500
				Number plate on dash or under front seat
1918	B	6	\$1290	501-2350
1919	B	4	1395	2351-6200
1920	B	6	1495	6300 to 8299

Number plate on left side engine. Engine number same as car number.

Name changed to Courier

MARMON

Year	Model	Cyls.	Price	Serial Numbers
1912	32	4	\$2750	112001-1212001
1913	32	4	3000	2113001-2813001
	48	6	5000	1113002-1813000
1914	41	6	3250	114002-814000
	48	6	5000	1114002-1814000
1915	41	6	3250	115002-815000
	48	6	5000	1215002-1815000
1916	41	6	3250	116002-816000
	34	6	2750	1516002-1816000
1917	34	6	3100	
			5500	317002-817000
1918	34	6	3550	
			6500	418002-818000
1919	34	6	3950	
			5750	419001-819001
1920	34	6	4650	
			6450	2200001-8200001
1921	34	6	3985	2220001 to 12220001

Numbers on heel board of driver's seat and on left side of main frame.

MAXWELL

Year	Model	Cyls.	Price	Serial Numbers
1912	16	2	\$ 625	
	25	4	950	
	30	4	1150	
	36	4	1480	
1913	22	4	785	
	30	4	1145	
	40	4	1675	
	25	4	750	
1914	35	4	1225	I-14000
	50-6	6	1975	
	25	4	695	
1915			Gas Light	14001-52000
			750	
			Electric Light	52001-113205
1916	25	4	655	
1917	25	7- 1-16	4	595
		1- 1-17	4	634
		1- 1-17	4	665
		1- 1-17	4	655
1918	25	7- 1-17	4	655
		8- 6-17	4	745
		3- 1-18	4	825
1919	25	7- 1-18	4	825
		10- 4-18	4	895
		7- 1-19	4	895
1920	25	7-12-19	4	985
1921	25	4	845	266801 up
Number on name plate on right end of front seat base. Number on roadster appears on left side of driver's seat.				

MERCER—Continued

Year	Model	Cyls.	Price	Serial Numbers
1913	J & K	4	\$2700	
	G	4	2900	991-1590
1914	35J	4	2600	
	35 HO	4	2900	1591-2098
1915	22-70	4	3000	2099-2549
1916	22-72	4	3000	2550-3299
1917	22-73	4	3500	3300-4099
1918	Series 4	4	4200	
			4500	4100-4600
1919	Series 5	4	4200	
			4500	4600 up
1920	Series 5	4	4950	9001 and up
1921	5	4	4500	12000-16500

Number on right hand rear spring hanger

METEOR

Year	Model	Cyls.	Price	Serial Numbers
1920	R	4	\$5000	625 and up
				Number attached to clutch
1921	R & RR	4	\$5500	
				Discontinued

METZ

Year	Model	Cyls.	Price	Serial Numbers
1912	22	4	\$ 495	15000-18301
1913	22	4	495	18302-22949
1914	22	4	475	22950-28800
(Also 300 cars numbered from 28801 to 29100 on which equipment determines model.)				
1915	22	4	\$ 495	29101-32200
(All the above have double chain drive and 22 H. P. engine and are roadsters.)				
	25	4	\$600	33000-36380
1916	25	4	600	36381-40248
1917	25	4	545	
1918	25	4	695	40249-44552
1919	Master Six	6	1695	45015-47508
1920	Master Six	6	1995	50646 to 51527
Number same as motor number and is found on side of motor				
1921	M-6	6	\$1995	
				Discontinued

MITCHELL

Year	Model	Cyls.	Price	Serial Numbers
1912	2-4 4-4 5-4	4	....	22000-30000
	2-6 5-6 7-6	6	....
1913	2-4 5-4	4	....	30001-31500
	2-6 5-6	6	....	35000-36284
	7-6	6	....	39500-39668
1914	A-40	4	....	40501-41500
	A-50	6	....	44001-46000
	A-60	6	....	49001-49250
1915	B-35	4	....	50001-51800
	B-45	6	....	55001-56000
	B-48	8	....	57001-57100
Number plate on heel board of front seat on right engine guard, and on left front frame member.				
1916	B-48	8	....	58000-60000
	C-12	6	....	60001-64905
1917	C-12	6	....	65001-69956
1917	D-40	6	....	70000-85000
1918	C-12	6	....	90000-95000
1919	E-42	6	....	95501-96495
1920	E-40	6	\$1475	97001 to 106400
	E-42	6	1675	95501 to 96500
	F-40	6	1750	1 and up
	F-42	6	1995	12001 and up
Number on toe board. Serial numbers not carried under yearly designations.				
1921	F-40	6	\$1790	7001 and up
	F-42	6	1995	12001 and up

MOLINE

Year	Model	Cyls.	Price	Serial Numbers
1912	M	4	\$1700	2362-2785
1913	M-40	4	1950	2786-3999
			2500	
1914	MK-50	4	3250	4001-4999
			3800	
1915	MK-40	4	1375	6001-6250
1916	MK-40	4	1450	6250-7012
1917	G-50	4	1840	8000-8330
	C-40	4	1495	9000-10999
1918	G-50	4	2250	8331-8450
	L-40	4	2000	11000-11220
			2500	
1919	G-50	4	2250	8451-8999
	L-40	4	2000	
			2500	11221-11600
Name changed to R & V Knight in December, 1919. Name on dash plate and on front left side of engine.				

MONITOR

Year	Model	Cyls.	Price	Serial Numbers
1920	M	6	\$1575	3316 to 4200
				Number on end of right side
				Discontinued

MONROE (Indianapolis)

Year	Model	Cyls.	Price	Serial Numbers
1919	S-9	4	\$1295	..... 16609
1920	S-9	4	1195	15599 to 18374
	S-10	4	1195	
1921	S-10	4	1295	
Number under hood right side of dash				

MONROE (Pontiac, Mich.)

Year	Model	Cyls.	Price	Serial Numbers
1915	2	4	\$ 495	501 up
1916	4	4	1095	8000 up
1917	3	4	565	4001 up
	6	4	1095	9151 up
1918	M-4	4	995	
				Discontinued

MOON

Year	Model	Cyls.	Price	Serial Numbers
1912	30	..	....	5371-5470
	40	..	....	6022-7000
	48	..	....	7002-7119
1913	30	..	....	5472-5483
	39	..	....	8001-8365
	48	..	....	7121-7293
	6-50	..	....	31002-31081
1914	42	..	....	13001-14344
	4-38	..	....	14401-14453
	6-50	..	....	31082-41351
	6-40	..	....	61304-61530
1915	4-38	..	....	14451-14500
	6-30	..	....	70000-70242
	6-40	..	....	61521-61953
	6-50	..	....	41354-41891
1916	6-30	..	....	70245-70666
	6-43	..	....	70667-71087
	6-44	..	....	62053-62252
	6-66	..	....	62253-66564
1917	6-43	..	....	71088-71293
	6-45	..	....	71394-71819
	6-66	..	....	66565-66884
	6-36	..	....	36000-36225
1918	6-36	..	....	36226-36996
	6-64	..	....	66885-67043
1919	6-46 Victory	..	....	46001-47551
	6-64	..	....	67044-66078
1920	6-48	6	\$1885	48001 to 49317
	6-68	6	....	68101 to 68286
1921	648	6	2185	98286 and up
Numbers are up to Sept. 15, 1920				
Number on dash				

MOORE

Year	Model	Cyls.	Price	Serial Numbers
1919	30	4	\$ 895	1600
		4	995	7000/8149
1920	30	4	1095	8150 up
Number under hood on right side of body; engine number on right side engine.				
				Discontinued

MURRAY MACK

Year	Model	Cyls.	Price	Serial Numbers
1921	80T	6	\$4250	1050 to 1250
Number on dash under hood				

NASH (Formerly Jeffery) No yearly models

Year	Model	Cyls.	Price	Serial Numbers
	681, 5-P Spt.	6	....	100101-100114
	681	6	....	100612-111600
			....	127851-131825
	682, 7-P Tr.	6	....	111601-113601
	683	6	....	121001-122500
	684, Sedan	6	....	100108-100611
			....	119851-121000
			....	144331 up
	685, Coupe	6	....	94501-95000
			....	119913-119928
			....	144806-145405
			....	131851, 133251, 133351
			....	up
687, 4-P Rd				
Number on left front cross member, just back of radiator				
1920				Serial numbers on application.
1921	681-7	6	\$1545	188437 to 195753
	682	6	1695	181130 to 208440
	41-4	4	1195	1345 to 7193

NATIONAL

Year	Model	Cyls.	Price	Serial Numbers
1912	MCC	4	\$2900	5501-7000
1913	M3C	4	3300	7001-8100
	V-3	4	3400	8101-9000
1914	6-W	6	2375	9001-10100
1915	AA	6	2375	10101-11100
1915-16	AB	6	2500	11101-14000
1916	AC	6	1690	14001-16000
	AD	12	1990	16001-17000
1917	AE	6	1750	17003-18000
	AH	12	2150	18001-20000
	AF-1	6	1995	20001-24000
	AF-2	6	2150	24001-25000
	AK-1	12	2585	25001-25550
1918	AK-2	12	2750	25551-27000
	AF-3	6	2150	27001-28000
1919	AL	6	2450	28001-28979
	AM	12	3050	32000-32148
1920	BB	6	3290	60000 up
1921	Sextet (6)	6	....	32149 and up
	BB	6	2900	
Numbers on cars up to 1913 inclusive will be found riveted to the rear cross member of the frame. All cars after 1913 have the serial number on the left side of the frame, either under the front or rear fender.				

NELSON

Year	Model	Cyls.	Price	Serial Numbers
1917	A	4	\$1800	1001-1082
	BB	4	1290	1004-1125
	C	4	1400	1059-1101
1918	D	4	1450	1112-1187
1919	D	4	1500	1188 up
1920	D	4	1700	1213 to 1500
1921	D	4	1900	
Number on dash plate; engine number top of right front crank-case arm.				

NOMA

Year	Model	Cyls.	Price	Serial Numbers
1920	1	6	\$2900	300 to 600
1921	1C	6	3200	600 and up
Number on front spring				

NORWALK

Year	Model	Cyls.	Price	Serial Numbers
1920	4-30	4	....	9000 to 9872
				Number on dash
1921	430KS	4	\$1135	
				Discontinued

OAKLAND

Year	Model	Cyls.	Price	Serial Numbers
1912	30	4	\$1200	7001-8000
			....	11001-11500
	40	4	1450	8001-9000
			....	9650-11000
	45	4	2100	9001-9500
1918	35	4	1075	35001-37500
	42	4	1600	40001-43601
	60	6	2400	60001-60951
1914	36	4	1200	36000-364000
	48	6	1785	48000-481150
	62	6	2500	62000-620100
1915	37	4	1200	37000-373599
	49	6	1685	49000-490500
Number on front heel board				
1916	32	6	\$ 795	32000-328000
			....	33000-347100
	38	4	1050	38000-384001
1916-17	50	8	1585	50000-502000
Number on heel board of driver's compartment, or on left rear cross frame member.				
1917	34	6	\$ 875	134-3000034
1918	34-B	6	....	3000134 up
1919	34-B	6	....	11699934
1920	34-C	6	1165	11700134 to 15235634
1918 number on heel board; 1919 on heel board and on right rear side member.				
1921	34-C	6	\$1145	15235634 to 16755034
Number on frame opposite left rear wheel				

OLDSMOBILE

Year	Model	Cyls.	Price	Serial Numbers
1913	40	4	\$2500	80325-80999
	53	6	3200	81000-81500
1914	54	6	2975	83000-83999
	42	4	1285	84001-84399
1915	42	4	1285	84500-92499
	55	6	2975	92500-92999
1916	43	4	1095	93000-99999
	43	4	1095	109000-109499
	44	8	1195	
			1775	109500-118782
			1850	
1917	45	8	1775	
			1295	
			1850	119000-135276
			1367	
	45	8	1295	143000-144500
		8	....	148900-148925
	37	6	1095	150000 up
			1675	192000-200000
			1295	
1918	45A	8	1700	1325277-142999
				145000-149999
1919	37A1	6	1395	37AT1 & 37AR1 up
			1895	37AS1 & 37AC1 up
	45B	8	1895	45BT1, 45BP1 & 45BS1 up
1920	45-B Touring	8	1395	45-B-T-1 to 45-B-T 8297
	45-B-P (Sport)	8	....	45-B-P-1 to 45-B-T 3062
	45-B-R-T Tour.	8	....	45-B-R-T-1 to 45-B-R-T 599
	45-B Sedan	8	....	45-B-S-1 to 45-B-S 1032
1921	43A	4	1445	7 to 10786
	47	8	1695	1 to 1990
	46	8	2100	49 to 625

Numbers on right, on cow under hood on brass plate

PACKARD—Continued				
1915	2-38	6	\$3350	53026-56000
	48			63026-66000
1916	3-38	6	3750	75026-76999
	5-48	6	4850	78026-78386
1916	1-25	12	2750	80026-90000
	1-35	12		
	2-25	12		125051-150000
	2-35	12		
1917	2-25	12	3050	
	2-35	12	3500	
1918	3-25	12	3700	150051 up
	3-35	12	4100	
1919	3-25	12	3950	
	3-35	12	4300	
1920	Twin Six	12	5550	160130 to 165662
	Number on right front leg of motor			
1923	Single Six	6	\$2975	U9000 and up
	Twin Six	12	6000	820000 and up
Number on plate on dash directly back of change speed lever.				
PAIGE				
Year	Model	Cyls.	Price	Serial Numbers
1911-12	25	4	\$ 975	3000-4499
				1000
1912-13	25	4	975	4500-6999
				1000
1913	25	4	975	7000-9170
1914	25	4	975	9171-9999
1913-14	36	4	1275	10001-14000
1914-15	36	4	1075	14000-20000
	46	6	1395	55000-59999
1915-16	36	6	1095	80000-81500
	46	6	1295	60000-66000
1916-18	46	6	1375	65000-69999
	38	6	1090	85000-89923
1917-18	39		1330	89924-101999
	39	6	1395	102001 up
1917-18	51	6	1495	70000-74999
	55	6	2060	75000-79500
1919	55	6	2060	82001 up
	55	6	2165	82001 up
Number plate under left front seat cushion				
1920	15-19	6	\$1595	200000 and up
	M-18	6	2195	118000 and up
Serial and motor numbers are together on the left side of motor.				
1921	6-42	6	\$1635	211903 to 217507
	6-66	6	2875	126314 to 130948
Number under right hand front seat				
PAN-AMERICAN				
Year	Model	Cyls.	Price	Serial Numbers
1918	E-6-48	6	\$1800	500-1200
Number on frame horn				
1919	E-6-48	6		3000-3322
	F-6-48			
	G-6-48			
1920	E-6-55	6	\$2250	3000 and up
Number on left front spring hanger				
Discontinued				
PATERSON				
Year	Model	Cyls.	Price	Serial Number
1912	G	4	\$1600	4001-4425
	H	4	1850	
1913	45	4		6001-6350
	47	4	1850	8001-8052
1914	33	4	1200	9300-9700
	32	4	1200	9010-9059
1915	6-48	6	1400	1000-1101
	4-32	4	1200	X100-X573
1916	6-42	6	995	301-1302
1917	6-45	6		5001-6986
1918-19	6-46	6		6989-9504
1920	6-47	6		1201 up
	6-50	6	2100	1500 and up
	6-50	6	2130	
	6-50		Sedan	3300 18000 and up
			Coupe	3300 18100 and up
1921	6-50	6	6 Touring	1925 15000-15690
			Sedan	2895 18001 and up
Number on left side of seat				
PATHFINDER				
Year	Model	Cyls.	Price	Serial Numbers
1912	12	4	\$1750	500-802
1913	13	4	2185	1000-1342
1914	14	4	2185	
	14	6	2750	1500-1716
1915	.....	.....	2222	
	.....	.....	2750	2002-2566
1916	Six	6	1695	
	Twelve	12	2475	2901-4175
1917	3-B	12	2750	8001-17525
Discontinued				
Number on dash plate				
PEERLESS				
Year	Model	Cyls.	Price	Serial Numbers
1912	33	4	\$4300	12001-12900
	35	6	4000	121001-121296
	36	6	5000	122001-122439
	37	6	6000	123001-123068
1913	35	6	4300	131001-131251
	36	6	5000	132001-132386
	37	6	6000	120368-123123
1914	36	6	5000	142001-142589
	37	6	6000	143001-143058
1915	36	6	5000	152001-152100
	54	4	2000	DD101-DD2500
	55	6	2250	EE101-EE5000
PEERLESS—Continued				
1916	Series 1	8	\$1890	160001-160000*
1917	Series 2 & 3	8	1890	170001-179000
1918	Series 4	8	2340	230001 up
*To March 21				
1919	Series 5	8	2900	260000 to 266900
1920	Series 6	8		
Since 1916 series models instead of yearly models adopted.				
Number on dash.				
1921	56-S-7	8	\$2990	270000-273687
PIEDMONT				
Year	Model	Cyls.	Price	Serial Numbers
1917	4-30	4	\$1095	1-400
	6-40	6	1545	400-500
1918	4-30	4	1095	500-1000
	6-40	6	1545	1000-1200
1919	4-30	4	1235	1200-2500
	6-40	6	1685	2500-3000
After Dec. 15, 1919, number on main floor board				
1920	4-30	4	\$1395	1800 to 3000
	6-40	6	1695	
Number on dash				
Discontinued				
PIERCE-ARROW				
Year	Model	Cyls.	Price	Serial Numbers
1912	36 H. P.	6	\$4000	32200-33200
				9199-9201-57
	48 H. P.	6	5000	9259-9321, 9323-9522
				9524-42, 9544-9667, 9669-9684, 9686-9769, 9771-10000, 10002-8, 10010, 10012-19, 10021-26, 10028-35, 10037-58, 10060-1, 10064-5, 10077-8, 10083, 10088, 10095, 10105, 10122, 10126-7, 66298-66500
1913	38-C	6	4300	33301-34050
	48-B	6	5000	10301-11125
				9543, 9668, 9685, 9770, 10001, 10009, 10011, 10059, 10062-3, 10066-76, 10079-82, 10084-87, 10089-94, 10106-9, 10111-12, 10115-16, 10118-19, 10121, 10123-25, 10128-32, 10137, 10139-40, 10159, 10165, 10187-8, 10197-8
	48-D	6	5000	9200, 9258, 9322, 9523, 10020, 10027, 10035, 10110, 10113-4, 10117, 10120, 10133-6, 10138, 10141-9, 10150-3, 10154-8, 10160-4, 10166-86, 10189-96, 10199, 10200
	48-D2	6	5000	66601-66800
1914	66-A1	6	6000	66801-66800
	38-C2	6	4300	34101-34603 and 34047
	48-B2	6	5000	11201-12100 and 11100
	66-A2	6	6000	66900-66964
1915	38-C3	6	4300	34701-35450
	48-B3	6	5000	12301-13050
	66-A3	6	6000	67050-67150
1916	38-C3	6	4300	35601-36350
	48-B3	6	5000	13051-13650
	66-A3	6	6000	67050-67150
	38-C4	6	4300	36601-37605
	48-B4	6	5000	13901-14900
	66-A4	6	6000	67201-67405
1917	38-C4	6	4300	37701-38701
	48-B4	6	5000	15001-16000
	66-A4	6	6000	67499-67800
1918	48-B4	6	5000	16001-16400
	48-B5	6	6500	16401-17400
1919	48 H. P.	6	7750	511001-511375
	38 H. P.	6	7250	512001-512375
				513001-513300
				312001-312375
1920	38	6	7250	313001 to 313500
	48	6		314001 to 314500
	48	6	7750	514001 to 514500
	48	6		515001 to 515700
1921	.....	6	7500	321001-322999
Number beneath left front door				
PILOT				
Year	Model	Cyls.	Price	Serial Numbers
1912	40	4	\$1800	400-500
1913	40	4	2000	
	50	4	2250	1400-1550
	60	6	2500	
1914	50	4	2500	1551-1621
	60	6	2785	
1915	55	6	1885	1700-1755
1916	6-45	6	1100	
	6-55	6	1685	1756-2070
	8-55	8	1785	
1917	6-45	6	1150	2071-2999
1918	6-45	6	1295	3000-3575
1919	6-45	6	1650	3575 up
Number on left frame horn				
1920	6-45	6	\$1895	
	5-pass. Tour.	6		
	6-45	6		
	4-pass. Road.	6	1945	4380 to 5044
	6-45	6		
	5-pass. Sedan	6	2900	
	6-45	6		
	4-pass. Coupe	6	2850	
1921	6-45	6	1895	
	6-50	6	2285	
Number on left front frame horn				
PORTER—(Previous to 1919, see F. R. P.)				
Year	Model	Cyls.	Price	Serial Numbers
1919-20	46	4	\$6750	110 to 519
				Number on right hand front spring
1921	40	6	\$6750	519 and up
Discontinued				
PREMIER				
Year	Model	Cyls.	Price	Serial Numbers
1912	4-40	4	\$3700	5000-7000
	6-60	6	4100	
	6-40	6	3900	7000-9000
1913	6-60	6	4200	
1913½	6-48	6	3700	10000-10499
	6-49	6	3800	
			3900	10500-19999
1914	A	6	3900	12000-13000
1915	6-50	6	3700	
			3900	65150-1615000
1916	6-51	6	3900	
1917	6B	6	3200	
				3400 0001-2912
1918	6C	6	3200	
				3710
1919	6C	6	3200	3501-4511
				3400
				3710
1920	6D	6	4600	5011 and up
1912 to 1916 inclusive, number left frame member, center and near step hanger.				
1917 to 1919 inclusive, number under front cushion on left side, on right starting crank on front cross member, and on front spring hanger.				
1921	6-D	6	\$3690	5001-6799
PREMOCAR				
Year	Model	Cyls.	Price	Serial Numbers
1921	6-40A	6	\$1295	
RANGER				
Year	Model	Cyls.	Price	Serial Numbers
1920	A-20	4		1001 to 13000
Discontinued				
REGAL				
Year	Model	Cyls.	Price	Serial Numbers
1912	N	4	\$ 900	2201-5100
	L	4	1000	2101-3000
	H	4	1400	301-450
1913	T	4	950	5101-7700
	C	4	1250	1-450
	H	4	1400	451

Buyers' Guide to 1923 Cars

Wherein MOTOR AGE Presents the Price, Wheelbase and Number of Cylinders of All American Manufactured Gasoline Cars. The Cars Are Grouped According to Body style and the general arrangement of the Cars in Each Class Is from the Lowest to the Highest Priced in That Class. Complete Mechanical Specifications Follow

Two and Three Passenger Roadsters

Name-Model	Price	No. Cyls	Wheelbase
Ford-T	\$ 269†	4	100
Star	319†	4	102
Ford-T	364*	4	100
Star	414*	4	102
Gray	490	4	100
Overland-91	525	4	100
Chevrolet-Superior	510	4	103
Premier-Strattan	575	4	102
Chevrolet-M	710	4	103
Dodge	850	4	114
Buick-1923-34-			
5-6-7-38	865	4	100
Dort-19-14	865	4	108
Seneca-L-2 & 0-2	875	4	108
Maxwell	885	4	109
Durant-A-22	890	4	100
Nash-41-4	915	4	112
Oldsmobile-43-A	955	4	115
Gardner-T-R & G	965	4	112
Oakland-6-44	975	6	115
Studebaker-Light Six	975	6	112
Seneca-50 & 51	985	4	112
Dort-25-20	990	6	115
Columbia-Light Six	995	6	115
Jewett-Six	995	6	112

Dort-19-14	1,015‡	4	108
Buick-1923-34-			
5-6-7-38	1,025‡	4	100
Cleveland-42	1,085	6	112½
Premcar-6-40-A	1,095	6	117
Hupmobile-Series R.	1,115	4	112
Oakland-6-44	1,145‡	6	115
Buick-1923-41-4			
5-47	1,175	6	118
Tulsa-E 1-2-3	1,175	4	117
Chalmers-1923	1,185	6	117
Courier	1,195	6	116
Nash-691-3-6-7	1,210	6	121
Hupmobile-Series R.	1,215‡	4	112
Willis-Knight-20	1,235	4	118
Studebaker-Sp'cl. Six	1,250	6	119
Velle-58	1,275	6	115
Stephens-10	1,345	6	117
Handley-6-40	1,350	6	115
Elear-8-R	1,395	6	118
Eearl-40	1,485	4	112
Mitchell-F-50	1,490	6	120
Anderson-Series 50	1,495	6	120
Courier	1,495‡	6	116
Davis-71	1,495	6	115
Haynes-55	1,545	6	121
Liberty-10-D	1,575	6	117
Chandler-Six	1,595‡	6	123
Davis-63-65	1,595	6	120

Hanson-66	1,595	6	121
King-LL	1,595	8	120
Durant-B-22	1,600	6	123½
Buick-1923-48-9-50-4-			
55	1,625‡	6	124
Oldsmobile-47	1,625	8	115
Sayers Six-DP	1,645	6	118
Lexington-23	1,695	6	123
Case-X	1,750	6	122
Anderson-Series 50	1,785‡	6	120
King-L	1,795	8	124
Cole-800	1,885	8	127¼
Haynes-55	1,895‡	6	121
Jordan-MX	1,895	6	120
Merit	1,895	6	119
Franklin-10	1,900	6	115
Stutz-6	1,995	6	120
Pilot-650	2,050	6	126
Standard-98	2,150	8	127
H. C. S.-Series 4	2,250	4	120

Stearns-Knight-SKL-4	2,250	4	125
Haynes-75	2,395	6	132
Stutz-KLDH	2,450	4	130
National-6-71	2,475	6	130
Packard-126	2,485	6	126
Princeton	2,485‡	6	128
Noma-4C	2,500	6	128

Willis Sainte Clair-			
A-68	2,575	8	121
Stutz-KLDH	2,670‡	4	130
Roamer-6-54-E	2,685	6	128
Paige-6-70	2,695	6	131
Stearns-Knight-6	2,700	6	130
Stanley-740	2,750	2	130
Cadillac-61	2,885	8	132
Premier-6-D	3,150	6	126¾
Marmon-34	3,185	6	136
Peerless-23	3,300	8	128
Marmon-34	3,385‡	6	136
Winton-40	3,400	6	132

Roamer-4-75-E	3,685	4	128
Roamer-4-75-E	3,785	4	128
Lincoln	3,800	8	136
Packard-335	3,850	12	136
Fox-7F	3,900	6	132
Mercer-Series 5	3,950	4	132
LaFayette	3,985	8	132
Daniels-23-38	4,350	8	132
Pierce-Arrow	5,250	6	138
McFarlan-1923	5,400	6	140

Duesenberg-			
Straight 8	6,500	8	134
Rolls-Royce-40-50	10,900	6	143½
‡ Sport models.			
* Price with starter and demountable rims.			
† Price without starter and demountable rims.			

Two and Three Passenger Enclosed Cars

Name-Model	Price	No. Cyls	Wheelbase
Ford-T	\$ 530	4	100
Star	580	4	102
Chevrolet-Superior	680	4	103
Gray	685	4	100
Overland-91	795	4	100
Chevrolet-M	880	4	103
Premier-Strattan	895	4	102
Dodge	980	4	114
Maxwell	985	4	100

Dort-19-14	1,020	4	108
Gardner-T-R & G	1,115	4	112
Dort-25-20	1,145	6	115
Essex	1,145	4	108½
Buick-1923-34-5-6-7-			
38	1,175	4	100
Oakland-6-44	1,185	6	115
Nash Four-41-4	1,195	4	112
Oldsmobile-43A	1,195	4	115
Studebaker-Light Six	1,225	6	112
Maxwell	1,235	4	109
Columbia-Light Six	1,235	6	115
Dort-19-14	1,240	4	108
Dort-25-20	1,265	6	115
Durant-A-22	1,365	4	109
Hupmobile-Series R.	1,385	4	112
Nash Four-41-4	1,385	4	112

Oldsmobile-43 A	1,475	4	115
Chalmers-1923	1,595	6	117
Liberty-10-D	1,695	6	117
Premcar-6-40-A	1,750	6	117
Westcott-C-44	1,795	6	120
Oldsmobile-47	1,875	8	115
Studebaker-Spec. Six	1,875	6	119
Buick-1923-48-9-50-4-			
55	1,895	6	124
Buick-1923-41-4-5-47	1,935	6	118
Auburn-6-51	1,965	6	121
Elear-6-60	1,975	6	118
Liberty-10-D	2,085	6	117
Davis-63-65	2,095	6	120
Durant-B-22	2,250	6	123½
Haynes-55	2,395‡	6	121
Paterson-22-6-52	2,395	6	120
Case-X	2,480	6	122
King-L	2,500	8	124
Cole-800	2,585	8	127¼
H. C. S.-Series 4	2,600	4	120
Sayers Six-D. P.	2,645	6	118
Standard-98	2,750	8	127
Pilot-6-50	2,950	6	126

R & V Knight-H	3,015	6	124
Haynes-75	3,095	6	132
Haynes-75	3,250‡	6	132
Peerless-23	3,300	8	128
Princeton	3,350	6	128
Stutz-KLDH	3,490	4	130
Roamer-6-54-E	3,585	6	128
Apperson-8-21-S	3,625	8	130
Cadillac-61	3,675	8	132
Marmon-34	3,985	6	136
Winton-40	4,000	6	132
Premier-6-D	4,300	6	128¾
Mercer-Series 5	4,850	4	132
Fox-7F	4,900	6	132
McFarlan-1923	6,720	6	140
Pierce-Arrow	6,800	6	138
Duesenberg-			
Straight 8	7,800	8	134
‡ Sport models.			

Four and Five Passenger Phaetons

Name-Model	Price	No. Cyls	Wheelbase
Ford-T	\$ 298†	4	100
Star	348†	4	102
Ford-T	393*	4	100
Star	443*	4	102
Gray	490	4	100
Chevrolet-Superior	525	4	103
Overland-91	525	4	100
Premier-Strattan	575	4	102
Chevrolet-M	725	4	103
National-6-31	795	6	112
Dort-19-14	865	4	108
Seneca-L-2 & 0-2	875	4	108
Dodge	880	4	114
Buick-1923-34-5-6-7-			
38	885	4	109
Maxwell	885	4	109
Durant-A-22	890	4	109
Nash-41-4	935	4	112
Elear-4-40	965	4	112
Gardner-T-R & G	965	4	112
Oldsmobile-43-A	975	4	115
Columbia-Light Six	985	6	115
Seneca-50 & 51	985	4	112
Dort-25-20	990	6	115
Cleveland-42	995	6	112½
Jewett-Six	995	6	112
Oakland-6-44	995	6	115
Studebaker-Light Six	975	6	112
Dort-19-14	1,015‡	4	108

Essex	1,045	4	108½
Gardner—T R & G	1,065	4	112
Oldsmobile—43 A	1,075	4	115
Auburn—6-43	1,095	6	114
Columbia—Light Six	1,095	6	115
Durant—A-22	1,095	4	109
Earl—40	1,095	4	112
Jewett—Six	1,095	6	112
Premocar—6-40-A	1,095	6	117
Hupmobile—Series R	1,115	4	112
Kelsey—4	1,150	4	111
Elcar—4-40	1,165	4	112
Oakland—6-44	1,165	6	115
Tulsa—E-1-2-3	1,175	4	117
Chalmers—1923	1,185	6	117
Anderson—41	1,195	6	114
Buick—1923-41-4-5-47	1,195	6	118
Flint	1,195	6	120
Nash—41-4	1,195	4	112
Hupmobile—Series R	1,215	4	112
Courier	1,235	6	116
Willys Knight—20	1,235	4	118
Nash—691-3-6-7	1,240	6	121
Cleveland—42	1,260	6	112½
Auburn—6-51	1,275	6	121
Studebaker—Spec. Six	1,275	6	119
Studebaker—Spec. Six	1,275	6	119
Velle—58	1,275	6	115
Davis—71	1,295	6	115
Moon—6-40	1,295	6	115
Stephens—10	1,295	6	117
Velle—58	1,305	6	115
Handley—6-40	1,350	6	115
Oldsmobile—43 A	1,350	4	115
Oldsmobile—47	1,375	8	115
Paterson—22-6-52	1,390	6	120
Barley	1,395	6	118
Columbia—Light Six	1,395	6	115
Elcar—S-R	1,395	6	118
Liberty—10-D	1,395	6	117
Hudson—Super 6	1,425	6	126
Moon—6-40	1,445	6	115
Columbia—Big Six	1,475	6	115
Kissel—55	1,485	6	121
National—6-51	1,485	6	121
Rickenbacker—A	1,485	6	117
Anderson—Series 50	1,495	6	120
Barley	1,495	6	118
Davis—71	1,495	6	115

Apperson—6	1,535	6	.....
Courier	1,565	6	116
Velle—58	1,565	6	115
Liberty—10-D	1,575	6	117
Mitchell—F-50	1,590	6	120
Chandler—Six	1,595	6	123
Davis—63-65	1,595	6	120
Anderson—Series 50	1,595	6	120
Hanson—66	1,595	6	121
Haynes—55	1,595	6	121
King—LL	1,595	8	120
King—LL	1,595	8	120
Nash—691-3-6-7	1,645	6	121
Reo—T6	1,645	6	120
Sayers Six—DP	1,645	6	118
American Steamer	1,650	2	127
Durant—B-22	1,650	6	123½
Auburn—6-63	1,650	6	122
R & V Knight—R	1,665	4	116
Buick—1923-48-9-50-4-55	1,675	6	124
Kissel—55	1,685	6	121
Westcott—C-44	1,690	6	120
Chandler—Six	1,695	6	123
Davis—63-65	1,695	6	120
Hanson—66	1,695	6	121
Lexington—23	1,695	6	123
Reo—T6	1,745	6	120
Hatfield—55	1,775	6	121
American—D-66	1,785	6	127
Moon—6-58	1,785	6	128
Case—X	1,790	6	122
Jordan—MX	1,795	6	120
King—L	1,795	8	124
King—L	1,795	8	124
Studebaker—Big Six	1,835	6	126
Studebaker—Big Six	1,835	6	126
Haynes—55	1,850	6	121
Mitchell—F-50	1,850	6	120
American—D-66	1,885	6	127
Cole—890	1,885	8	127¼
Kissel—45	1,885	6	124
Westcott—C-44	1,890	6	120

Auburn—6-51	1,895	6	121
King—LL	1,895	8	120
Merit	1,895	6	119
Anderson—Series 50	1,945	6	120
Case—W	1,950	6	129
Franklin—10	1,950	6	115
Hatfield—55	1,975	6	121
Stephens—10	1,985	6	117
American—D-66	1,995	6	127
King—L	1,995	8	124
Lexington—23	1,995	6	123
Moon—6-58	1,995	6	128
Stutz—6	1,995	6	120
Pilot—6-50	2,000	6	126
Lexington—23	2,045	6	123
Stephens—20	2,085	6	124
Jordan—H	2,150	6	124½
Case—W	2,230	6	122
H. C. S.—Series 4	2,250	4	120
Stearns-Knight—SK14	2,250	4	125
Stearns-Knight—SK14	2,275	4	125
Kissel—45	2,385	6	124
Standard—98	2,395	8	127
Paige—6-70	2,450	6	131
National—6-71	2,475	6	130
Willis Sainte Claire—A-68	2,475	8	121
National—6-71	2,485	6	130
Packard—126	2,485	6	126
Roamer—6-54-E	2,485	6	128
Princeton	2,585	6	128
Haynes—75	2,550	6	132
Holmes—Series 4	2,500	6	126
Noma—4C	2,500	6	128
H. C. S.—Series 6	2,650	6	126
Noma—4C	2,600	6	128
Packard—126	2,650	6	126
Stearns-Knight—6	2,700	6	130
Roamer—6-54-E	2,750	6	128
Stanley—740	2,750	2	130
Stutz—KLDH	2,790	4	130
Apperson—S-21-S	2,800	8	130
R & V Knight—H	2,850	6	124
Willis Sainte Claire—A-68	2,875	6	127
Cadillac—61	2,885	8	132
Fox—7F	2,975	6	132
Peerless—23	2,990	8	128

Premier—6-D	3,100	6	126¾
Stutz—KLDH	3,165	4	130
Marmon—34	3,185	6	136
Marmon—34	3,435	6	136
Roamer—4-75-E	3,485	4	128
Crawford-Dagmar—6-70	3,500	6	138

Winton—40	3,600	6	132
Roamer—4-75-E	3,650	4	128
Mercer—6	3,750	6	132
Lincoln	3,800	8	136
Packard—335	3,850	12	136
Dorris—6-80	3,950	6	132
Mercer—Series 5	3,950	4	132
LaFayette	4,090	8	132
Doris—6-80	4,150	6	132
LaFayette	4,300	8	132
Daniels—23-38	4,350	8	132
Pierce-Arrow	5,250	6	138
McFarlan—1923	5,600	6	140
Locomobile—Series 8	7,600	6	142
Rolls-Royce—40-50	10,900	6	143½

‡ Sport models.
† Price without starter and demountable rims.
* Price with starter and demountable rims.

Four and Five Passenger Enclosed Cars

Name—Model	Price	No. Cyl-inders	Wheel-base
Ford—T	\$ 595	4	100
Star	645	4	102
Ford—T	725	4	100
Gray	785	4	100
Gray	835	4	100
Chevrolet—Superior	840	4	103
Chevrolet—Superior	860	4	103
Overland—91	860	4	100
Premier—Strattan	995	4	102

Chevrolet—M	1,040	4	103
National—6-31	1,050	6	112
Chevrolet—M	1,060	4	103
Dort—19-40	1,070	4	108
Dodge	1,195	4	114
Dort—25-20	1,195	6	115
Essex	1,245	4	108½
Nash Four—41-4	1,275	4	112
Buick—1923-34-5-6-7-38	1,325	4	109
Maxwell	1,335	4	109
Durant—A-22	1,365	4	109
Gardner—T-R & G	1,365	4	112
Dort—19-14	1,370	4	108
Columbia—Light Six	1,395	6	115
Buick—1923-34-5-6-7-38	1,395	4	109
Elcar—4-40	1,425	4	112
Dodge Brothers	1,440	4	114
Jewett—Six	1,445	6	112
Oakland—6-44	1,445	6	115
Kelsey—4	1,450	4	111
Anderson—41	1,450	6	114
Auburn—6-43	1,465	6	114
Jewett—Six	1,465	6	112
Durant—A-22	1,465	4	109
Cleveland—42	1,485	6	112½
Dort—25-20	1,495	6	115

Hudson—Super Six	1,525	6	126
Hupmobile—Series R	1,535	4	112
Nash Four—41-4	1,545	4	112
Oakland—6-44	1,545	6	115
Studebaker—Light Six	1,550	6	112
Chalmers—1923	1,585	6	117
Moon—6-40	1,585	6	115
Willys-Knight—20	1,595	4	118
Stephens—10	1,595	6	117
Oldsmobile—43 A	1,595	4	115
Anderson—41	1,595	6	114
Maxwell	1,635	4	109
Hupmobile—Series R	1,675	4	112
Willys-Knight—20	1,695	4	118
Moon—6-40	1,695	6	115
Chandler—Six	1,695	6	123
National—6-51	1,785	6	121
Willys-Knight—20	1,795	4	118
Velle—58	1,795	6	115
Earl—40	1,795	4	112
Davis—71	1,795	6	115
Premocar—6-40 A	1,825	6	117
Reo—T 6	1,835	6	120
Barley	1,850	6	118
Reo—T6	1,885	6	120
Rickenbacker—A	1,885	6	117
National—6-51	1,885	6	121
Nash—692-4-5	1,890	6	127
Moon—6-40	1,895	6	115
Flint	1,895	6	120
Stephens—10	1,895	6	117
Rickenbacker—A	1,985	6	117
Buick—1923-41-4-5-49	1,985	6	118
Flint	1,985	6	120
Anderson—Series 50	1,995	6	120
Chandler—Six	1,995	6	123
Columbia—Big Six	1,995	6	115
King—LL	1,995	8	120

Oldsmobile—47	2,025	8	115
Nash—691-3-6-7	2,040	6	121
Mitchell—F 50	2,050	6	120
Studebaker—Spec. Six	2,050	6	119
Courier	2,055	6	116
Elcar—6-60	2,065	6	118
Westcott—D-48	2,095	6	125
Hudson—Super Six	2,095	6	126
Lexington—23	2,145	6	123
Hatfield—55	2,175	6	121
Chandler—Six	2,195	6	123
Buick—1923-48-9-50-4-55	2,195	6	124
King—L L	2,200	8	120
Liberty—10 D	2,245	6	117
Auburn—6-51	2,245	6	121
Hatfield—55	2,275	6	121
Mitchell—F-50	2,275	6	120
Chalmers—1923	2,295	6	117
Lexington—23	2,345	6	123
Paterson—22-6-52	2,395	6	120
Durant—B-22	2,400	6	123½
King—L L	2,400	8	120
Studebaker—Big Six	2,450	6	126
Hanson—66	2,475	6	121
R & V Knight—R	2,475	4	116

Case—W	2,480	6	120
American—D-66	2,485	6	127
Jordan—M X	2,485	6	120
Westcott—C-44	2,490	6	120

King—L	2,500	8	124
Lexington—23	2,545	6	123
Studebaker—Big Six	2,550	6	126
Stutz—6	2,550	6	120
Hudson—Super Six	2,570	6	126
Case—X	2,575	6	122
Moon—6-58	2,585	6	128
Hanson—66	2,585	6	121
Haynes—55	2,595	6	121
King—L	2,625	8	124
Sayers Six	2,645	6	118
Cole—800	2,685	8	127 1/4
Westcott—C-44	2,690	6	120
Haynes—55	2,695	6	121
Franklin—10	2,750	6	115
Franklin—10	2,850	6	115

Case—W	2,975	6	129
Kissel—45	2,975	6	124
Pilot—6-50	3,000	6	126
Kissel—45	3,075	6	124
Packard—126	3,175	6	126
Standard—98	3,200	8	127
Paige—6-70	3,235	6	126
National—6-71	3,250	6	130
Packard—126	3,275	6	126
Wills St. Claire—A-68	3,275	8	121
Holmes—Series 4	3,300	6	126
Packard—126	3,325	6	126
Packard—126	3,350	6	126
Princeton	3,350	6	128
Peerless—23	3,400	8	128

R & V Knight H	3,500	6	124
Noma—4 C	3,500	6	128
Roamer—6-54-E	3,585	6	128
Stanley—740	3,585	2	130
National—6-71	3,725	6	130
Cadillac—61	3,750	8	132
Apperson—8-21-S	3,750	8	130
Cadillac—61	3,950	8	132
Stanley—740	3,950	2	130
Peerless—23	3,990	8	128

Crawford-Dagmar 6-70	4,250	6	138
Marmon—34	4,385	6	136
Lincoln	4,400	8	136
Stutz—KLDH	4,450	4	130
Crawford—23-6-60	4,500	6	138
Roamer—4-75-E	4,650	4	128
Lincoln	4,700	8	136
Mercer—6	4,700	6	132

Fox—7 F	4,900	6	132
Dorris—6-80	4,985	6	132
Premier—6-D	5,100	6	126 1/4
Rubay	5,100	4	118
Packard—335	5,240	12	136
Rubay	5,250	4	118
Daniels—23-38	5,350	8	132

Daniels—23-38	6,000	8	132
McFarlan—1923	6,720	6	140
Pierce Arrow	6,900	6	138
Rolls Royce—40-50	12,900	6	143 1/2
Rolls Royce—40-50	13,150	6	143 1/2

‡ Sport models.

Six and Seven Passenger Phaetons

Name—Model	Price	No. Cyls	Wheel base
Auburn—6-51	\$1,345	6	121
Chalmers—1923	1,345	6	122
Nash—692-4-5	1,390	6	127
Paterson—22-6-52	1,425	6	120
Buick—1923-48-9-50-54			
55	1,435	6	124
Willys-Knight—27	1,435	4	124
Hudson—Super 6	1,475	6	126
Reo—T 6	1,485	6	120
Chandler—Six	1,545	6	123
Anderson—Series 50	1,595	6	120
Oldsmobile—46	1,675	8	122
Stephens—20	1,685	6	124
Mitchell—F-50	1,690	6	127
Oldsmobile—46	1,735	8	122
Studebaker—Big Six	1,750	6	126
Lexington—23	1,795	6	123

American—D-66	1,850	6	127
Oldsmobile—46	1,850	8	122
Cole—800	1,885	8	127 1/4
Case—W	1,900	6	129
Pilot—6-50	2,050	6	126
Lexington—23	2,095	6	123
Handley—6-60	2,150	6	125

National—6-71	2,375	6	130
Kissel—45	2,385	6	124
Haynes—75	2,395	6	132
Standard—98	2,395	8	127
Paige—6-70	2,450	6	131
Stearns-Knight—SKL-4	2,450	4	125
Princeton	2,485	6	128
Holmes—Series 4	2,500	6	126
Haynes—75	2,550	6	132
Stutz—KLDH	2,640	4	130
Packard—133	2,685	6	133
Roamer—6-54-E	2,685	6	128
Stanley—740	2,750	2	130
Wills Sainte Claire—A-68	2,790	6	127

Stearns-Knight—6	2,850	6	130
Cadillac—61	2,885	8	132
Apperson—8-21-S	2,900	8	130
R & V Knight—H	2,900	6	124
Peerless—23	2,900	8	128
Crawford—23-6-60	3,000	6	138
Stutz—KLDH	3,015	4	130
National—6-71	3,150	6	130
Marmon—34	3,185	6	136
Premier—6-D	3,250	6	126 1/4

Winton—40	3,400	6	132
Marmon—34	3,435	6	136
Mercer—6	3,750	6	132
Lincoln	3,800	8	136
Roamer—4-75-E	3,800	4	128
Packard—335	3,850	12	136
Dorris—6-80	3,950	6	132
Mercer—Series 5	3,950	4	132
LaFayette	4,090	8	132
Daniels—23-38	4,350	8	132
Pierce Arrow	5,250	6	138
McFarlan—1923	5,700	6	140
Locomobile—Series 8	7,600	6	142
Rolls Royce—40-50	10,950	6	143 1/2

‡ Sport models.

Six and Seven Passenger Enclosed Cars

Name—Model	Price	No. Cyls	Wheel base
Earl—40	\$1,795	4	112
Willys-Knight—27	1,995	4	124
Nash—692-4-5	2,190	6	127
Auburn—6-51	2,245	6	121
Chandler—Six	2,295	6	123
Chandler—Six	2,375	6	123
Stephens—20	2,385	6	124
R & V Knight—R	2,385	4	116
Moon—6-58	2,485	6	128
Oldsmobile—46	2,635	8	122
Cole—800	2,685	8	127 1/4
Moon—6-58	2,685	6	128
Studebaker—Big Six	2,750	6	126

Stearns-Knight—SKL4	3,150	4	125
Paige—6-70	3,235	6	131
National—6-71	3,285	6	130
Haynes—75	3,395	6	132
Stearns-Knight—SKL4	3,450	4	125
Wills St. Claire—A-68	3,475	8	121
Stearns-Knight—6	3,500	6	130
Packard—133	3,525	6	133
Princeton	3,550	6	128
Packard—133	3,575	6	133
Holmes—Series 4	3,600	6	126
Stearns-Knight—6	3,700	6	130
R & V Knight—H	3,700	6	124
Apperson—8-21-5	3,800	8	130
National—6-71	3,825	6	130
Wills St. Claire—A-68	3,850	8	121
Stanley—740	3,985	2	130
Peerless—23	4,090	8	128
Cadillac—61	4,300	8	132
Marmon—34	4,385	6	136
Stearns-Knight—6	4,500	6	130
Winton—40	4,550	6	132

Winton—40	4,700	6	132
Lincoln	4,900	8	136
Mercer—6	5,000	6	132
Rubay	5,200	4	118
Mercer—Series 5	5,250	4	132
Packard—335	5,275	12	136
Packard—335	5,400	12	136
LaFayette	5,500	8	132
Dorris—6-80	5,750	6	132

McFarlan—1923	6,810	6	140
Pierce-Arrow	7,000	6	138
Duesenberg—Straight 8	7,800	8	134
McFarlan—1923	9,000	6	140
Locomobile—Series 8	9,150	6	142
Locomobile—Series 8	10,500	6	142
Locomobile—Series 8	10,700	6	142

Limousines

Name—Model	Price	No. Cyls	Wheel base
Chandler—6	\$2,995	6	123
Franklin—10	3,150	6	115
Packard—Single 6	3,325	6	126
Paige—6-70	3,550	6	131
Princeton	3,550	6	132
Packard—Single 6	3,575	6	133
Wills St. Claire—A-68	3,850	8	121
Roamer—6-54-E	3,950	6	128
Peerless—23	4,090	8	128
Cadillac—61	4,250	8	132
Premier—6-D	4,300	6	126 1/4
Cadillac—61	4,580	8	132
Stearns Knight—6	4,590	6	130
Cadillac—61	4,600	8	132
Winton—40	4,700	6	132
Peerless—23	4,900	8	128
Lincoln	5,100	6	136
Premier—6-D	5,200	6	126 1/4
Packard—335	5,275	12	136
Rubay	5,300	4	118
LaFayette	5,750	8	132
LaFayette	6,250	8	132
Pierce-Arrow	7,000	6	138
Stevens Duryea—E	8,600	6	138
Stevens Duryea—E	8,900	6	138
Locomobile—48	9,150	6	124
Rolls Royce—40-50	12,900	6	143 1/2

Landaulets

Name—Model	Price	No. Cyls	Wheel base
Jordan—MX	\$2,485	6	120
Pierce-Arrow	7,000	6	138

Broughams

Name—Model	Price	No. Cyls	Wheel base
Durant—A-22	\$1,465	4	109
Velle—58	1,795	6	115
Courier	1,895	6	116
Auburn—6-51	1,965	6	114
Elcar	1,995	6	118
Reo—T-6	2,185	6	120
Jordan—MX	2,485	6	120
Kissel—55	2,585	6	121
Lexington—23	2,645	6	123
Franklin—10	2,750	6	115
H C 8-5	2,850	4	120
Westcott—C-44	2,940	6	120
Paige—6-70	3,135	6	131
Wills St. Claire—A-48	3,375	8	121
Stearns Knight—6	3,700	6	130
Wills St. Claire—A-48	3,850	8	121
Stanley—740	3,950	2	130
Roamer—5-54	4,090	6	128
Peerless—23	4,390	8	128
Stearns Knight—6	4,500	6	130
Mercer—6	4,700	6	132
Rubay	5,250	4	118
Daniels—D-19	6,250	8	132
Pierce-Arrow	6,800	6	138
Daniels—D-19	7,100	8	132
Lincoln	7,200	6	136
Daniels—D-19	7,250	8	132
Stevens Duryea—E	8,900	6	138
Rolls Royce—40-50	12,850	6	143 1/2

Mechanical Specifications of 1923 Passenger Cars

MAKE AND MODEL			Wheel Base (Ins.)	Tire Size †	Weight of Standard Phaeton (lbs)	ENGINE															FUEL FEED			Generator and Starter Make
						Make	Model	No. of Cylinders Bore and Stroke	H. P. (N. A. C. C.)	Piston Displacement in Cubic Ins.	Valve Arrangement	Piston Material	Camshaft Drive	Camshaft Location	COOLING		OILING SYSTEM							
															Controlled by	Water Circulation	Type of System	Type of Pump	Carburetor Make	Model	Fuel Feed			
† American	C	127	32x4	HS	11,000	6-3 1/2 x 5 1/2	25.35	248.9	"L" H.	CI	M-G	IC	None	Pump	SP-PR	Strom	LB2	Vac	G & D					
American Steamer		117	32x4	Own		6-3 1/2 x 4 1/2	23.44	195.6	"L" H.	CI	Chain	IC	None	Pump	Press	None			L-N					
Anderson	41	124	32x4	2550	Cont.	6Y	27.34	242.1	"L" H.	CI	N-M-G	IC	None	Pump	Press	Zenith	T4X	Vac	West					
Anderson	50	122	32x4	2950	Cont.	8R	23.44	207.1	"L" H.	CI		IC	None	Pump	Press	Rayf.	U	Vac	Remy					
Apperson	6	130	32x4			6-3 1/2 x 5	33.80	331.8	"L" H.	CI	M-G	IC	None	TH-S	FL-PR	John	A	Vac	Bijur					
Apperson	8	130	32x5			6-3 1/2 x 5 1/2	23.44	195.6	"L" H.	CI	Chain	IC	None	Pump	Press	Strom		Vac	Remy					
Auburn	6-43	114	31x4		Cont.	6Y	27.34	242.1	"L" H.	CI	C-G	IC	None	Pump	Press	Strom		Vac	Remy					
Auburn	6-51	121	32x4		Cont.	8R	27.34	242.1	"L" H.	CI	C-G	IC	None	Pump	Press	Strom		Vac	Remy					
Auburn	6-63	122	32x4 1/2			6-3 1/2 x 5	25.35	248.9	"L" H.	CI	Chain	IC	None	Pump	Press	Strom		Vac	Remy					
Barclay		118	32x4	2700	Cont.	6Y	23.44	195.6	"L" H.	CI	Chain	IC	None	Pump	Press	Strom	O-1	Vac	Delco					
Bay State		121	32x4	2935	Cont.	8R	27.34	242.6	"L" H.	CI	C-G	IC	Ther	Pump	Press	Strom	O-2	Vac	Delco					
Bay State		128	32x4 1/2	3450	Cont.	8R	27.34	242.6	"L" H.	CI	C-G	IC	Ther	Pump	Press	Strom	O-2	Vac	Delco					
Beggs Six		120	32x4	2862	Cont.	8R	27.34	242.6	"L" H.	CI	C-G	IC	None	Pump	Press	Strom	LS2	Vac	A-L					
Brewster	02	125	32x4 1/2	3800	Own		25.60	276.5	ST	CI	Chain	IC	None	Pump	FL-PR	Zenith	L6B	Vac	U. S. L.					
Buick	34-5-6-7-8	109	31x4	2455	Own		18.23	170.0	IH	CI	M-G	IC	None	Pump	SP-PR	Marvel	K	Vac	Delco					
Buick	41-4-5-7	118	32x4 1/2	3080	Own		27.34	242.6	IH	CI	M-G	IC	None	Pump	SP-PR	Marvel	K	Vac	Delco					
Buick	48-9-50-4-5	124	32x4 1/2	3355	Own		27.34	242.6	IH	CI	M-G	IC	None	Pump	SP-PR	Marvel	K	Vac	Delco					
Cadillac	61	132	32x5	3955	Own		31.25	314.4	"L" H.	CI	Chain	IC	Ther	Pump	Press	Own		Press	Delco					
Case	X	122	32x4 1/2	2950	Cont.	8R	27.34	241.6	"L" H.	CI	M-G	IC	Ther	Pump	SP-PR	Rayf.	8-T-3	Vac	Delco					
Case	W	129	34x4 1/2	3690	Cont.	6T	31.54	234.8	"L" H.	CI	Chain	IC	Ther	Pump	SP-PR	Rayf.	G-4	Vac	Delco					
† Chalmers	1923	117	32x4		Own		29.40	224.0	"L" H.	AL	Chain	IC	None	Th-S	Press	Strom		Vac	A-L					
† Chalmers	1923	122	32x4		Own		29.40	224.0	"L" H.	AL	Chain	IC	None	Th-S	Press	Strom		Vac	A-L					
Chandler		123	32x4		Own		29.40	288.6	"L" H.	CI	Chain	IC	None	Pump	SP-PR	Strom	OE2	Vac	Boech					
Chevrolet	M	103	30x3 1/2	1670	Own		19.60	137.7	IH	AL	M-G	IC	None	Air	Splash	Carter		Vac	Remy					
Chevrolet	Superior	103	30x3 1/2		Own		21.76	170.8	IH	CI	M-G	IC	None	Pump	SP-PR	Zenith	T4X	Vac	A-L					
Cleveland	42	112 1/2	31x4	2645	Own		22.50	199.0	IH	CI	Chain	IC	None	Pump	SP-PR	Strom	OS	Vac	Boech					
Climber	125 1/2	125 1/2	32x4 1/2	3250	H-S	90	27.34	230.1	IH	CI	N-M-G	IC	None	Pump	SP-PR	Strom	MB	Vac	West					
Climber	1	117	32x4	2700	H-S	7,000	19.25	192.4	IH	CI	M-G	IC	None	Th-S	SP-PR	Strom	MB	Vac	West					
Cole	880	127 1/2	33x5		North	M309	35.22	346.3	"L" H.	AI	C-G	IC	Ther	Pump	SP-PR	John	R	Vac	Delco					
Columbia Light	6	115	31x4	2510	Cont.	6Y	23.44	195.6	"L" H.	CI	Chain	IC	Special	Pump	Press	Strom	LB1	Vac	A-L					
Columbia	Big 6	115	32x4	2950	Cont.	8R	27.34	241.6	"L" H.	CI	C-G	IC	T & S	Pump	FL-PR	Strom	LS2	Vac	A-L					
Courier		116	32x4	2750	Falls	78,000	23.44	195.6	IH	CI	N-M-G	IC	None	Th-S	Press	Strom	OS-1	Vac	West					
Crawford	6-60	138	33x4 1/2	4000	Cont.	6T	31.54	324.0	"L" H.	CI	Chain	IC	Ther	Pump	Press	Zenith	N6 B284	Vac	West					
Crawford Dagmar	23-6-70	138	33x5	4000	Cont.	6T	31.54	324.0	"L" H.	CI	Chain	IC	Ther	Pump	Press	Zenith	N6 B284	Vac	West					
Cunningham	V4	132	33x5	4500	Own		45.00	441.8	"L" H.	CI	C-G	IC	Ther	Pump	Press	Strom	O	Vac	Delco					
Cunningham	V4	142	33x5	4500	Own		45.00	441.8	"L" H.	CI	C-G	IC	Ther	Pump	Press	Strom	O	Vac	Delco					
Daniels	23-38	132	33x5	4200	Own		39.20	404.1	"L" H.	CI	M-G	IC	None	Pump	Press	Strom		Press	Delco					
Davis	63-65	120	32x4 1/2	2930	Cont.	8R	27.34	241.6	"L" H.	CI	C-G	IC	None	Pump	Press	Strom	LS2	Vac	Delco					
Davis	71	115	31x4	2085	Cont.	6Y	22.40	195.6	"L" H.	CI	Chain	IC	None	Pump	Press	Strom		Vac	Delco					
Dodge Brothers		114	32x4	2535	Own		24.03	212.0	"L" H.	CI	M-G	IC	None	Pump	SP-PR	Ecc	Stewart		N-E					
Dorris	6-80	132	33x5	4115	Own		38.40	377.0	IH	CI	M-G	IC	None	Pump	SP-PR	Strom	OS	Vac	West					
Dort	18 & 23	108	31x4		Lye		19.60	192.0	"L" H.	CI	M-G	IC	None	Th-S	SP-PR	Strom		Vac	Boech					
Dort	25-20	115	31x4	2500	Falls	T-8,000	23.44	195.6	IH	CI	C-G	IC	None	Th-S	FL-PR	Strom		Vac	Boech					
Duesenberg	8	134	33x5	3300	Own		26.45	260.0	IH	AI	M-G	OH	Ther	Pump	Press	Strom	OU3	Vac	Delco					
† Durant	A-22	109	31x4	2135	Own	Durant	24.00	200.5	IH	CI	M-G	IC	None	Pump	Press	Strom	L-1-A	Vac	A-L					
† Durant	B-22	123 1/2	32x4 1/2		Anst.	D	25.35	224.0	IH	CI	C-G	IC	None	Pump	Press	Ray	MRV4	Vac	A-L					
Earl	40	112	32x4	2430	Own		18.90	195.0	"L" H.	CI	C-G	IC	None	Th-S	SP-PR	Pist.	See	Vac	A-L					
Elcar	4-40	112	31x4		Lye	K	19.60	192.4	"L" H.	CI	M-G	IC	None	Pump	SP-PR	Pist.	Strom	Vac	Delco					
Elcar	6-60	118	32x4		Cont.	7R	25.35	224.0	"L" H.	CI	M-G	IC	None	Pump	Press	Strom		Vac	Delco					
Essex		108 1/2	32x4	2600	Own		18.20	179.0	"L" H.	AI	Chain	IC	Shut	Th-S	Splash	Own		Vac	Boech					
Filnt		120	32x4 1/2		Cont.	Durant	27.30	268.4	"L" H.	CI	Chain	IC	Ther	Pump	FL-PR	Strom		Vac	A-L					
Ford		100	30x3 1/2	1571	Own		22.50	176.7	"L" H.	CI	M-G	IC	None	Th-S	Splash	Own		Grav	Own					
Fox		132	32x4 1/2	3300	Own		27.00	268.3	IH	AL	Chain	OH	None	Air	Press	Zenith	U	Vac	West					
Franklin	10	115	32x4	2490	Own		25.30	199.0	IH	AL	Chain	IC	None	Air	SP-PR	Own		Vac	NE					
Gardner	T-R-C-S	112	32x4	2490	Lye	CE	21.50	214.0	"L" H.	AI	C-G	IC	None	Th-S	Press	Carter	RB0	Vac	West					
Gray		100	30x3 1/2	1600	Own		21.03	165.1	"L" H.	CI	M-G	IC	None	Th-S	Splash	None	See	Grav	West					
Handly	6-40	115	32x4 1/2	2600	Falls		23.44	195.6	IH	CI	C-G	IC	None	Th-S	Press	Strom	OS-1	Vac	Boech					
Handly	6-80	125	32x4 1/2	3200	Midw		27.34	268.4	IH	CI	Chain	IC	None	Pump	FL-PR	Strom		Vac	Delco					
H. C. S.	Series IV	120	32x4 1/2	3240	Weid		22.00	242.0	IH	CI	C-G	IC	None	Pump	SP-PR	Strom		Press	Delco					
H. C. S.	6	126	32x4 1/2		Midw	620	29.40	288.6	IH	CI	Chain	IC	None	Pump	FL-PR	Strom		Press	Delco					
Hanson	66	121	32x4	2750	Cont.	8R	27.34	241.6	"L" H.	CI	C-G	IC	None	Pump	Press	Marvel	M-1	Vac	Delco					
† Hatfield	A-42	115	32x4		H-S	7000	19.60	192.4	"L" H.	CI	M-G	IC	None	Th-S	SP-PR	Zenith	HP	Vac	Dyneta					
Hatfield	6-35	121	32x4	2875	H-S	11,000	25.35	248.9	"L" H.	AI	M-G	IC	None	Pump	SP-PR	Strom	OS	Vac	Boech					
Haynes	75	132	33x5		Own		31.54	299.4	"L" H.	AI	Chain	IC	Ther	Pump	SP-PR	Strom	ON-3	Vac	L-N					
Haynes	55	121	32x4 1/2		Own		29.40	288.0	"L" H.	CI	N-M-G	IC	None	Pump	SP-PR	Ray	M-3	Vac	L-N					
Holmes	Series 4	126	34x4 1/2	2900	Own		26.60	246.0	IH	AI	C-G	IC	Shut	Air	FL-PR	Strom	O	Vac	Dyneta					
Hudson	Super Six	126	34x4 1/2	3445	Own		29.40	288.0	"L" H.	AI	Chain	IC	Shut	Pump	Press	Own		Vac	Boech					
Huffman		120	32x4	2980	Cont.	8R	27.33	241.5	"L" H.	CI	C-G	IC	None	Pump	Press	Strom	O-2	Vac	Dyneta					
Hupmobile	R	112	32x4	2590	Own		16.90	183.0	"L" H.	CI	Chain	IC	None	Th-S	FL-PR	Strom	M	Vac	West					
Jewett		112	31x4	2630	Own		25.35	249.0	"L" H.	CI	C-G	IC	None	Pump	SP-PR	Strom	OS-2	Vac	Remy					
Jordan	MX	120	32x4	2935	Own		26.34	245.6	"L" H.	CI	Chain	IC	None	Pump	SP-PR	Strom	O-2	Vac	Delco					
Jordan	H	124 1/2	32x4 1/2	3000	Own		26.34	245.6	"L" H.	CI	Chain	IC	None	Pump	SP-PR	Strom	O-2	Vac	Delco					
Kissel	55	121	32x4		Own		26.34	284.4	"L" H.	CI	N-M-G	IC	Ther	Pump	Press	Strom	OS-2	Vac	Remy					
† Kissel	45	124	32x4 1/2		Own		19.60	192.4	IH	CI	M-G	IC	None	Th-S	SP-PR	Ecc	See	Vac	Remy					
Kelsey	G	111	32x4	2500	G-B	T1,050	26.34	282.8	"L" H.	CI	Chain	IC	None	Th-S	SP-PR	Ball & B.	DV-10	Vac	West					
King	LL	129	32x4 1/2	3560	Own		8.3	x5	28.80	282.8	"L" H.	CI	Chain	IC	None	Th-S	SP-PR	Ball & B.	DV-10	Vac	West			
King	L	124	32x4 1/2	3650	Own		27.34	241.5	"L" H.	CI	C-G	IC	None	Pump	Press	Ray	ST-3	Vac	Wagner					
Kline Kar	6-80-L	121	33x4	2850	Cont.	8R	27.34	241.5	"L" H.	CI	C-G	IC	None	Pump	SP-PR	Till		Vac	West					
Kurtz	65	122	33x4 1/2	3100	H-S		29.40	288.0	"L" H.	CI	M-G	IC	None	Pump	SP-PR			Vac	West					
Lafayette		132	33x5	4100	Own		33.80	348.0	"L" H.	CI	Chain	IC	Ther	Pump	Press	John		Press	Delco					
Lexington	23	123	32x4 1/2	3170	Anst.	C	25.35	224.0	IH	CI	C-G	IC	Ther	Pump	Press	Ray	MR-4	Vac	G & D					
Liberty	10-D	117	32x4		Own		23.40	230.0	"L" H.	CI	M-G	IC	None	Th-S	FL-PR	Strom	L-1	Vac	Wagner					
Lincoln		136	33x5																					

Mechanical Specifications of 1923 Passenger Cars

ELECTRICAL SYSTEM				TRANSMISSION										RUNNING GEAR									
Battery Make	IGNITION		CLUTCH		GEAR SET			UNIVERSAL		REAR AXLE				SPRINGS		BRAKES		STEERING GEAR		Front Axle Make	Frame Make	Chassis Lubrication	
	Make	Current Source	Make	Type	Make	Location	No. of Fwd Spds.	Make	Type	Make	Type	Gear Ratio	Propulsion Taken By	Torque Taken By	Type Front	Type Rear	Foot Type and Location	Hand Type and Location	Make				Type
Willard.	A-K	Bat.	B&B	S. P.	Warner.	UwE.	3	Hart.	M	Salis	F	4.50	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	War.	W&W.	Salis.	Wayne.	
Willard.	L-N	Bat.	None	S. P.	None	UwE.	3	Univ.	F	Own	Col.	1.75	S.	S.	1/2E	1/2E	Ext-Rw	Ext-DS.	Gem.	W&W.	Salis.	Sav.	PG
Willard.	West.	Bat.	B&B	S. P.	Dura.	UwE.	3	Univ.	F	Salis	Timk.	4.62	S.	S.	1/2E	1/2E	Ext-Rw	Ext-DS.	Gem.	W&W.	Salis.	Sav.	PG
Willard.	Remy.	Bat.	B&B	S. P.	Dura.	UwE.	3	Univ.	F	Salis	Timk.	4.62	S.	S.	1/2E	1/2E	Ext-Rw	Ext-DS.	Gem.	W&W.	Salis.	Sav.	PG
Exide.	Remy.	Bat.	Own	MDD.	Own	Sep U.	3	Thiem.	M	Own	Col.	4.25	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Own	W&W.	Own	Own	PG
Exide.	Remy.	Bat.	B&B	S. P.	Warner.	UwE.	3	Univ.	M	Col.	Col.	4.25	S.	S.	1/2E	1/2E	Ext-Rw	Ext-DS.	Own	S&N.	Col.	Smith.	PG
Exide.	Remy.	Bat.	B&B	S. P.	G-L.	UwE.	3	Univ.	M	Salis	Col.	5.00	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Ross	S&N.	Salis.	Smith.	GC
Exide.	Remy.	Bat.	B&B	SP.	Warner.	UwE.	3	Univ.	M	Col.	Col.	4.25	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Ross	S&N.	Col.	Smith.	GC
Prent.	Delco.	Bat.	B&B	S. P.	Fuller.	UwE.	3	M&E.	F	Col.	Col.	4.58	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Jac.	S&N.	Col.	Sav.	PG
Exide.	Delco.	Bat.	B&B	S. P.	Warner.	UwE.	3	Spicer.	M	Col.	Col.	4.67	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Col.	Hyd.	PG
Exide.	Delco.	Bat.	B&B	S. P.	Warner.	UwE.	3	Spicer.	M	Col.	Col.	4.67	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Col.	Hyd.	PG
Exide.	Conn.	Bat.	B&B	MDD.	Detroit.	UwE.	3	Arvae.	M	Timk.	Col.	4.67	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Dit.	W&W.	Timk.	P&B.	OC
U. S. L.	Bosch.	Mag.	Own	Cone.	Own	UwTT.	3	Own	F	Own	Col.	4.25	TT	TT	1/2E	1/2E	Int-Rw.	Int-Rw.	Own	S&N.	Own	Hyd.	OC
Exide.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Own	M	Own	Col.	4.66	TT	TT	1/2E	1/2E	Int-Rw.	Ext-Rw.	Jac.	S&N.	Own	Hyd.	PG
Exide.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Own	M	Own	Col.	4.40	TT	TT	1/2E	1/2E	Int-Rw.	Ext-Rw.	Jac.	S&N.	Own	Smith.	PG
Exide.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Own	M	Own	Col.	4.40	TT	TT	1/2E	1/2E	Int-Rw.	Ext-Rw.	Jac.	S&N.	Own	Smith.	PG
Exide.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Own	M	Own	Col.	4.40	TT	TT	1/2E	1/2E	Int-Rw.	Ext-Rw.	Jac.	S&N.	Own	Smith.	PG
Exide.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Own	M	Own	Col.	4.40	TT	TT	1/2E	1/2E	Int-Rw.	Ext-Rw.	Jac.	S&N.	Own	Smith.	PG
Exide.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Own	M	Own	Col.	4.40	TT	TT	1/2E	1/2E	Int-Rw.	Ext-Rw.	Jac.	S&N.	Own	Smith.	PG
Willard.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Spicer.	M	Timk.	F	Opt	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Own	W&S.	Col.	Own	PG
Willard.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Snead.	F	Col.	Col.	4.66	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Jac.	S&N.	Col.	Own	PG
Willard.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Arvae.	F	Col.	Col.	4.45	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Jac.	S&N.	Col.	Own	PG
Prent.	Remy.	Bat.	Own	MDD.	Own	UwE.	3	Arvae.	F	Col.	Col.	5.12	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Own	W&W.	Col.	Own	PG
Prent.	Remy.	Bat.	Own	MDD.	Own	UwE.	3	Arvae.	F	Col.	Col.	5.12	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Own	W&W.	Col.	Own	PG
Prent.	Remy.	Bat.	Own	MDD.	Own	UwE.	3	Arvae.	F	Col.	Col.	5.12	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Own	W&W.	Col.	Own	PG
Willard.	Bosch.	Bat.	B&B	S-P	Own	UwE.	3	Th.H	F	Own	Col.	4.45	S.	S.	1/2E	1/2E	Ext-Rw	Ext-Da	CAS	W&W.	Own	Own	OC
Willard.	Remy.	Bat.	Own	MDD.	Own	UwE.	3	Mech	M	Own	Col.	4.44	S.	TA	1/2E	1/2E	Ext-Rw	Ext-Da	Jac.	S&N.	Own	Smith.	GC
Willard.	Remy.	Bat.	Own	Cone.	Own	UwE.	3	Own	M	Own	Col.	3.77	TT	TT	1/2E	1/2E	Ext-Rw	Int-Rw.	Mun.	W&W.	Own	Own	GC
Prent.	Bosch.	Bat.	B&B	S-P	Own	UwE.	3	Mech	M	Own	Col.	4.90	S.	S.	1/2E	1/2E	Ext-Rw	Ext-Da	CAS	W&W.	Own	Hyd.	PG
U.S.L.	Bosch.	Mag.	Mun.	MDD.	Own	UwE.	3	Univ.	M	Adams	Col.	4.00	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	CAS	W&W.	Adams.	Own	GC
U.S.L.	A-K	Bat.	Mun.	MDD.	Own	UwE.	3	Hart.	M	Adams	Col.	4.00	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	CAS	W&W.	Adams.	Own	GC
Willard.	Delco.	Bat.	North.	MDD.	Own	UwE.	3	Spicer.	M	Col.	Col.	4.70	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Col.	Hyd.	GC
U.S.L.	A-L	Bat.	B&B	S-P	Durs.	UwE.	3	Spicer.	M	Timk.	Col.	4.80	S.	S.	1/2E	1/2E	Ext-Rw	Ext-Da	Gem.	W&W.	Timk.	P&B.	OC
Prent.	A-K	Bat.	B&B	S-P	Durs.	UwE.	3	Spicer.	M	Timk.	Col.	4.75	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Timk.	Detr.	GC
Willard.	A-K	Bat.	B&B	S-P	Mun.	UwE.	3	Flex.	F	Col.	Col.	5.00	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Lav.	S&N.	Pery.	Hyd.	AM
Willard.	Bosch.	Mag.	B-L	MDD.	B-L	UwE.	3	Spicer.	M	Timk.	Col.	4.75	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Lav.	W&W.	Timk.	Sharon.	PG
Willard.	Bosch.	Mag.	B-L	MDD.	B-L	UwE.	3	Spicer.	M	Timk.	Col.	4.75	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Lav.	W&W.	Timk.	Sharon.	PG
Willard.	Delco.	Bat.	Own	MDD.	Own	UwE.	4	Snead.	F	Timk.	Col.	3.50	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Timk.	P&B.	PG
Willard.	Delco.	Bat.	Own	MDD.	Own	UwE.	4	Snead.	F	Timk.	Col.	4.23	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Timk.	P&B.	PG
Willard.	Delco.	Bat.	Own	MDD.	Own	UwE.	4	Snead.	F	Timk.	Col.	4.23	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Timk.	P&B.	PG
Willard.	Delco.	Bat.	Own	MDD.	Own	UwE.	3	Spicer.	M	Timk.	F	4.23	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Timk.	P&B.	OC
Willard.	Delco.	Bat.	B&B	S-P	Warner.	UwE.	3	Peters.	M	Timk.	Col.	5.09	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	CAS	W&W.	Timk.	Smith.	OC
Willard.	Delco.	Bat.	B&B	S-P	Warner.	UwE.	3	Peters.	M	Timk.	Col.	5.10	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	CAS	W&W.	Timk.	Smith.	OC
Willard.	N.E	Bat.	Own	MDD.	Own	UwE.	3	Own	M	Own	Col.	4.17	S.	TT	1/2E	1/2E	Ext-Rw	Int-Rw.	Own	W&W.	Own	Own	PG
Willard.	Bosch.	Mag.	Own	MDD.	Warner.	UwE.	3	Spicer.	M	Timk.	Col.	4.23	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Ross	S&N.	Timk.	Own	OC
U.S.L.	Conn.	Bat.	Detl.	MDD.	Own	UwE.	3	Mech	M	Flint.	Col.	4.60	S.	TT	1/2E	1/2E	Ext-Rw	Int-Rw.	Jac.	S&N.	Flint.	Sav.	PG
U.S.L.	Bosch.	Bat.	Detl.	MDD.	Own	UwE.	3	Mech	M	Flint.	Col.	4.66	S.	TT	1/2E	1/2E	Ext-Rw	Int-Rw.	Sag.	S&N.	Flint.	Sav.	PG
Exide.	Delco.	Bat.	Own	S-P	Own	UwE.	3	Climax.	F	Own	Col.	4.45	TT	TT	1/2E	1/2E	Ext-Rw	Ext-Da.	Ross	S&N.	Flint.	Sav.	PG
U.S.L.	A-L	Bat.	Own	S-P	Warner.	Sep U.	3	Spicer.	F	Adams	Col.	4.33	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Warn.	W&W.	Adams.	Smith.	PG
U.S.L.	A-L	Bat.	Anst.	MDD.	Warner.	Sep U.	3	Spicer.	M-F	Adams	Col.	5.09	S.	TT	1/2E	1/2E	Ext-Rw	Int-Rw.	Warn.	W&W.	Adams.	Smith.	PG
U.S.L.	Conn.	Bat.	B&B	S-P	Own	UwE.	3	Own	F	Own	Col.	4.87	S.	S.	1/2E	1/2E	Ext-Rw	Ext-Da.	CAS	W&W.	Own	P&B.	PG
Willard.	Delco.	Bat.	B&B	S-P	Warner.	UwE.	3	Peters.	M	Salis	Col.	4.50	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Forst.	W&S.	Own	Own	
Willard.	Delco.	Bat.	B&B	S-P	Warner.	UwE.	3	Spicer.	M	Salis	Col.	4.75	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&S.	Own	Detr.	OC
Exide.	Bosch.	Bat.	Own	MDD.	Own	UwE.	3	Spicer.	M	Timk.	Col.	4.66	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	Gem.	W&W.	Own	Detr.	OC
U.S.L.	A-L	Bat.	Durant.	S-P	Warner.	Sep U.	3	Spicer.	M	Adams	Col.	4.77	S.	S.	1/2E	1/2E	Ext-Rw	Int-Rw.	War.	W&W.	Adams.	P&B.	PG
Exide.	Own	Bat.	Own	MDD.	Own	UwE.	2	Own	M	Own	Col.	3.63	TT	TT	1/2E	1/2E	Ext-Da	Int-Rw.	Own	Plan.	Own	P&B.	GC
Exide.	Seint.	Bat.	B-L	MDD.	B-L	UwE.	3	Spicer.	M	Timk.	Col.	4.90	S.	TA	1/2E	1/2E	Ext-Rw	Int-Rw.	Ross	S&N.	Timk.	P&B.	PG
Willard.	A-K	Bat.	B&B	S-P	Own	UwE.	3	Spicer.	M	Own	Col.	4.73	S.	S.	E11	E11	Ext-Da	Ext-Rw.	Own	W&G.	Own	Own	PG
Willard.	West.	Bat.	B&B	S-P	Mech.	UwE.	3	Mech	M	Flint.	Col.	4.80	S.	S.	1/2E								

Mechanical Specifications of 1923 Passenger Cars—Continued

MAKE AND MODEL	Wheel Base (Ins.)	Tire Size †	Weight of Standard Phaeton (lbs)	ENGINE															Generator and Starter Make	
				Make	Model	No. of Cylinders Bore and Stroke	H. P. (N. A. C. C.)	Piston Displacement in Cubic Ins.	Valve Arrangement	Piston Material	Crankshaft Drive	Crankshaft Location	COOLING		OILING-SYSTEM		FUEL FEED			
													Controlled by	Water Circulation	Type of System	Type of Pump	Carburetor Make	Model		Fuel Feed
Marmon.....	34	32x4½	3800	Own.		6-3½x5½	33.74	339.6	IH.	CI.	N-M-G.	IC.	None.	Pump.	FL-PR.	Gear.	Strom.	H-3.	Grav.	Dele.
Maxwell.....	109	31x4	3100	Own.		4-3½x4½	21.03	185.0	"L" H.	AI.	N-M-G.	IC.	None.	Th-S.	Press.	Gear.	Stewart.		Vac.	Remy.
McFarlan.....	140	33x5	4700	Own.		6-4½x6	48.60	572.0	"T" H.	AI.	M-G.	IC.	None.	Pump.	FL-PR.	Gear.	Ray.	G-5.	Vac.	West.
Mercer.....	Series 5	32x4½	3850	Own.		4-3½x5½	22.50	298.0	"L" H.	AI.	Chain.	IC.	None.	Pump.	FL-PR.	Gear.	Ball & B.		Vac.	A-L.
Mercer.....	Series 6	32x4½	3950	Own.		6-3½x5	33.75	331.3	IH.	AI.	N-M-G.	IC.	None.	Pump.	FL-PR.	Gear.	Strom.		Vac.	Dele.
Merit.....	B & C	32x4	2900	Cont.	7-R.	6-3½x4½	25.35	224.0	"L" H.	CI.	M-G.	IC.	None.	Pump.	Press.	Gear.	Zenith.	5-L.	Vac.	Dele.
Mitchell.....	5-50	32x4	3166	Own.		6-3½x5	29.40	288.6	"L" H.	St.	C-G.	IC.	Ther.	Pump.	SP-PR.	Gear.	Strom.	O-2.	Vac.	Remy.
Mitchell.....	5-50	32x4½	3325	Own.		6-3½x5	29.40	288.6	"L" H.	St.	C-G.	IC.	Ther.	Pump.	SP-PR.	Gear.	Strom.	O-2.	Vac.	Remy.
Monroe.....	S-9-10-14	32x3½	2400	Own.		4-3½x4½	27.00	141.0	IH.	AI.	C-G.	IC.	None.	Th-S.	Press.	Gear.	Zenith.	HP5A.	Vac.	A-L.
Moon.....	6-40	31x4	2650	Cont.	6Y.	6-3½x4½	23.44	195.6	"L" H.	CI.	Chain.	IC.	None.	Pump.	Press.	Gear.	Strom.	O.	Vac.	Dele.
Moon.....	6-58	33x4½	3300	Cont.	8R.	6-3½x4½	27.33	242.0	"L" H.	CI.	N-M-G.	IC.	None.	Pump.	Press.	Gear.	Strom.	O.	Vac.	Dele.
Noma.....		33x5	3000	Cont.	7R.	6-3½x4½	25.60	224.0	"L" H.	CI.	N-M-G.	IC.	None.	Pump.	Press.	Gear.	Zenith.	5-U.	Vac.	Dele.
Nash.....	692-4-5	32x4½	3290	Own.		6-3½x5	25.35	248.9	IH.	CI.	N-M-G.	IC.	None.	Pump.	SP-PR.	Gear.	Marvel.		Vac.	Dele.
Nash.....	41-4	33x4	2720	Own.		4-3½x5	18.20	178.9	IH.	St.	C-G.	IC.	None.	Pump.	SP-PR.	Gear.	Scheb.	A-1.	Vac.	Dele.
Nash.....	691-3-6-7	33x4	3205	Own.		6-3½x5	25.35	248.9	IH.	CI.	N-M-G.	IC.	None.	Pump.	SP-PR.	Gear.	Marvel.		Vac.	Dele.
National.....	6-71	32x4½	3780	Own.		6-3½x5½	29.40	303.0	IH.	SS.	Chain.	IC.	None.	Pump.	Press.	Gear.	Ray.	G4P.	Vac.	West.
National.....	6-51	32x4	3035	Cont.	8R.	6-3½x4½	27.30	241.6	"L" H.	CI.	N-M-G.	IC.	None.	Pump.	Press.	Gear.	Strom.	LS-2.	Vac.	A-L.
National.....	6-31	32x4	3035	Own.		6-3½x4½	27.30	241.6	"L" H.	CI.	N-M-G.	IC.	None.	Pump.	Press.	Gear.	Strom.	LS-2.	Vac.	A-L.
Oakland.....	6-44	32x4	2525	Own.		6-2½x4¾	18.90	177.0	IH.	AI.	Chain.	IC.	None.	Pump.	Press.	Gear.	Marvel.		Vac.	Remy.
Ogden Deluxe.....		33x5	4000	Cont.	6T.	6-3½x5½	31.54	325.0	"L" H.	CI.	Chain.	IC.	None.	Pump.	Press.	Gear.	Strom.	O-3.	Vac.	Bosh.
Oldsmobile.....	43A	32x4	2767	Own.		4-3½x5½	21.70	224.0	IH.	AI.	M-G.	IC.	None.	Pump.	SP-PR.	Gear.	Zenith.	T4X.	Vac.	Dele.
Oldsmobile.....	47	32x4	2810	Own.		8-2½x4½	26.45	234.0	"L" H.	CI.	N-M-G.	IC.	None.	Pump.	SP-PR.	Gear.	John.	B.	Vac.	Dele.
Oldsmobile.....	46	32x4½	3195	Own.		8-2½x4½	26.45	246.0	"L" H.	CI.	N-M-G.	IC.	None.	Pump.	SP-PR.	Gear.	Ball & B.	Double.	Vac.	Dele.
Overland.....	91	30x3½	2020	Own.		4-3½x4	18.23	143.1	"L" H.	CI.	M-G.	IC.	None.	Th-S.	Splash.	Gear.	Till.		Vac.	A-L.
Packard.....	220-31	32x4½	3144	Own.		6-3½x5	27.30	268.5	"L" H.	CI.	Chain.	IC.	Ther.	Pump.	Press.	Gear.	Own.		Vac.	A-K.
Packard.....	225-29	32x4½	3535	Own.		6-3½x5	27.30	268.5	"L" H.	CI.	Chain.	IC.	Ther.	Pump.	Press.	Gear.	Own.		Vac.	A-K.
Packard.....	Twin Six	33x5	4470	Own.		12-3½	43.20		"L" H.	CI.	Chain.	IC.	Ther.	Pump.	Press.	Gear.	Own.		Vac.	Remy.
Paige.....	6-70	33x4½	3607	Cont.	9-A.	6-3½x5	33.75	331.4	"L" H.	CI.	Chain.	IC.	Ther.	Pump.	SP-PR.	Gear.	Ray.	G4P.	Vac.	Remy.
Paterson.....	23-6-52	32x4½	3000	Cont.	8-R.	6-3½x4½	27.34	242.0	"L" H.	CI.	C-G.	IC.	None.	Pump.	Press.	Gear.	Strom.	LS-2.	Vac.	Dele.
Pearless.....	23	33x5	3775	Own.		8-3½x5	33.80	332.0	"L" H.	CI.	C-G.	IC.	None.	Pump.	Press.	Gear.	Ball & B.		Vac.	Dele.
Pierce Arrow.....		33x5	4590	Own.		6-4 x 5½	38.00	414.0	"T" H.	CI.	M-G.	IC.	Ther.	Pump.	FL-PR.	Gear.	Own.		Vac.	Dele.
Pilot.....		32x4½		H-S.	90.	6-3½x5	29.40	288.6	"L" H.	CI.	N-M-G.	IC.	Ther.	Pump.	Press.	Gear.	Tillot.		Vac.	Bijur.
Premier Stratton.....		30x3½		Own.		4-3 x 4½	14.40	127.5	"L" H.	S-S.	M-G.	IC.	None.	Th-S.		Gear.	Zenith.		Vac.	A-L.
Premier.....	6-D	32x4½	3865	Own.		6-3½x5½	27.34	295.0	IH.	AI.	C-G.	IC.	Ther.	Pump.	Press.	Gear.	Strom.	O-3.	Vac.	Dele.
Premocor.....	6-40-A	32x4	2940	Falls.	XP.	6-3½x4½	23.44	195.6	IH.	CI.	M-G.	IC.	None.	Th-S.	SP-PR.	Gear.	Strom.	MB.	Vac.	Bosh.
Princeton.....		32x4½		Anst.		6-3½x5½	27.34	281.8									Ray.		Vac.	A-L.
Princeton.....		33x5		Anst.		6-3½x5½	27.32	281.8									Ray.		Vac.	A-L.
R & V Knight.....	R	32x4	3040	Own.		4-3½x5	22.50	221.0	ST.	CI.	Chain.	IC.	None.	Th-S.	SP-PR.	Gear.	Strom.	OC-2.	Vac.	A-L.
R & V Knight.....	H	32x4½	3700	Own.		6-3½x5½	29.40	260.0	ST.	CI.	Chain.	IC.	None.	Th-S.	SP-PR.	Gear.	Strom.	OC-2.	Vac.	A-L.
Reo.....	76	32x4	3230	Own.		6-3½x5	24.30	239.0	"F" H.	AI.	C-G.	IC.	None.	Pump.	SP-PR.	Gear.	Ray.	LL3P.	Vac.	N. E.
Rickenbacker.....	A	32x4		Own.		6-3½x4½	23.44	218.0	"L" H.	CI.	Chain.	IC.	None.	Pump.	SP-PR.	Gear.	Strom.	O-2.	Vac.	Simms.
Roamer.....	6-54-E	32x4½	3700	Cont.	12XD.	6-3½x5½	29.40	303.0	"L" H.	AI.	C-G.	IC.	None.	Pump.	SP-PR.	Gear.	Strom.	OC-2.	Vac.	West.
Roamer.....	6-54-S	32x4½	4100	Cont.	12XD.	6-3½x5½	29.40	303.0	"L" H.	AL.	C-G.	IC.	None.	Pump.	SP-PR.	Gear.	Strom.	OC-2.	Vac.	West.
Roamer.....	4-75-E	32x4½	3700	Dues.	G1.	4-4½x6	28.90	340.0	IH.	AI.	Chain.	IC.	None.	Pump.	Press.	Gear.	Strom.	O-3.	Vac.	West.
Rolls Royce.....	143½	33x5	4800	Own.		6-4½x4¾	48.60	456.0	"L" H.	AI.	M-G.	IC.	Shut.	Pump.	Press.	Gear.	Own.		Vac.	Bijur.
Rubay.....	L	32x4	3100	Own.		4-2½x5½	12.10	122.0	IH.	AI.	M-G.	OH.	None.	Pump.	Press.	Gear.	Strom.	OR-1.	Vac.	Bosh.
Stephens.....	10	32x4		Own.		6-3½x4½	25.30	225.0	IH.	CI.	C-G.	IC.	None.	Th-S.	Press.	Gear.	Strom.	OS-2.	Vac.	Dele.
Stephens.....	20	33x4½		Own.		6-3½x4½	25.30	225.0	IH.	CI.	C-G.	IC.	None.	Th-S.	Press.	Gear.	Strom.	OS-2.	Vac.	Dele.
Sayers.....	Six	33x4	2800	Cont.	8R.	6-3½x4½	27.34	241.6	"L" H.	CI.	C-G.	IC.	None.	Pump.	Press.	Gear.	Strom.	LS-2.	Vac.	Dele.
Seneca.....	50 & 51	31x4	2500	Lyc.	KB.	4-3½x5	19.60	192.0	"L" H.	CI.	M-G.	IC.	None.	Th-S.	SP-PR.	Gear.	Zenith.	T4X.	Vac.	A-L.
Seneca.....	L2 & 02	30x3½	2380	Lyc.	KB.	4-3½x5	19.60	192.0	"L" H.	CI.	M-G.	IC.	None.	Th-S.	SP-PR.	Gear.	Zenith.	TX4.	Vac.	A-L.
Standard.....		32x4½		Own.		8-3½x5	33.80	331.8	"L" H.	CI.	N-M-G.	IC.	None.	Pump.	Press.	Gear.	Zenith.		Vac.	West.
Stanley.....	740	32x4	3550	Own.		2-4 x 5				CI.			None.	Pump.	SP-PR.	Gear.			Vac.	Bijur.
Star.....		30x3½	1735	Cont.	Special.	4-3½x4½	15.60	130.4	"L" H.	CI.	Chain.	IC.	None.	Pump.	SP-PR.	Gear.	Till.	Special.	Vac.	A-L.
Stearns Knight.....	SK14	32x4½		Own.		4-3½x5½	22.50	248.0	ST.	CI.	Chain.	IC.	None.	Pump.	Press.	Gear.	Ray.	GL4P.	Vac.	West.
Stearns Knight.....	E	33x5	3550	Own.		6-3½x5	27.34	268.0	ST.	CI.	Chain.	IC.	None.	Pump.	Press.	Gear.	Ray.	ST.	Vac.	West.
Stevens-Duryea.....	E	33x5	4250	Own.		6-4½x5½	47.20	510.3	"L" H.	CI.	C-G.	IC.	Ther.	Pump.	SP-PR.	Gear.	Strom.	O-3.	Vac.	West.
Studebaker Light.....	E	32x4½	2550	Own.		6-3½x4½	23.45	207.1	"L" H.	CI.	Chain.	IC.	Ther.	Pump.	SP-PR.	Gear.	Strom.	OS-1.	Vac.	Remy.
Studebaker Special.....	16	32x4	3155	Own.		6-3½x5	29.40	276.6	"L" H.	CI.	M-G.	IC.	None.	Pump.	SP-PR.	Gear.	Strom.	LS-2.	Vac.	Remy.
Studebaker.....	Big 6	32x4½	3310	Own.		6-3½x5	36.20	353.7	"L" H.	CI.	M-G.	IC.	None.	Pump.	SP-PR.	Gear.	Ball & B.	SV-12.	Vac.	Remy.
Stutz.....	4	33x4½	4070	Own.		4-4½x6	30.60	361.0	"T" H.	CI.	M-G.	IC.	None.	Pump.	Press.	Gear.	Strom.	OP-3.	Vac.	Remy.
Stutz.....	6	32x4		Own.		6-3½x5	27.34	268.0	IH.	CI.	Chain.	IC.	None.	Pump.	FL-PR.	Gear.	Strom.	Special.	Vac.	Remy.
Tulsa.....		33x4		H. S.		4-3½x5	19.60	192.4	"L" H.	CI.	M-G.	IC.	None.	Th-S.	SP-PR.	Gear.	Zenith.	HP1B.	Vac.	Dyneto.
Velie.....	58	32x4	2885	Own.		6-3½x4½	23.40	195.6	IH.	CI.	C-G.	IC.	None.	Th-S.	Press.	Gear.	Strom.	OS1.	Vac.	West.
Willis Knight.....	67	32x4½	3000	Own.		4-3½x4½	21.03	185.8	ST.	AL.	Chain.	IC.	None.	Th-S.	SP-PR.	Gear.	Till.		Vac.	A-L.
Willis St. Claire.....	A-68	32x4½	3115	Own.		8-3½x4	32.80	265.0	IH.	CI.	M-G.</									

Mechanical Specifications of 1923 Passenger Cars—Continued

ELECTRICAL SYSTEM			TRANSMISSION											RUNNING GEAR									
IGNITION			CLUTCH		GEAR SET		UNIVERSAL		REAR AXLE				SPRINGS		BRAKES		STEERING GEAR						
Battery Make	Make	Current Sources	Make	Type	Make	Location	No. of Fwd Spds.	Make	Type	Make	Type	Gear Ratio	Population Taken By	Torque Taken By	Type Front	Type Rear	Foot Type and Location	Hand Type and Location	Make	Type	Front Axle Make	Frame Make	Chassis Lubrication
Willard, U.S.L.	Delco Remy	Bat.	Own	MDD.	Own	UwTT	3	Spicer	M	Own	1 1/2 F	3.75	TT	TT	1 1/2 E	DTE	Ext-Rw	Int-Rw.	Own	S&N	Own	Own	PG
Willard, West.	Bat.	Own	Cone.	Own	B-L	Sep-U	3	Own	M	Own	1 1/2 F	4.60	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	Hyd	PG
Willard, Eiseim	Mag	B-L	MDD.	B-L	Sep-U	UwE	3	Peters	M	Timk	F	3.75	S	TA	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	Hyd	PG
Willard, Prest	Delco Remy	Bat.	B&B	S-P	Muncie	UwE	3	Spicer	M	Own	1 1/2 F	3.87	S	S	1 1/2 E	Int-Ds	Int-Rw.	Int-Rw.	Own	W&S	Own	Sav	OC
Willard, Willard	Delco Remy	Bat.	B&B	S-P	Own	UwTT	3	Snead	F	Col.	1 1/2 F	3.77	S	S	1 1/2 E	Int-Ds	Int-Rw.	Int-Rw.	Own	W&S	Own	Hyd	PG
Willard, Willard	Delco Remy	Bat.	B&B	S-P	Own	UwTT	3	Own	M	Own	1 1/2 F	4.60	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	Hyd	PG
Willard, Willard	Conn.	Bat.	B&B	S-P	Mech.	UwTT	3	Univ.	M	Own	1 1/2 F	4.42	S	TT	1 1/2 E	Cant.	Ext-Rw	Int-Rw.	Own	W&W	Own	Smith	PG
Exide, Exide	Delco	Bat.	B&B	S-P	Warner	UwE	3	Spicer	M	Own	1 1/2 F	5.30	RR	TA	1 1/2 E	Cant.	Ext-Rw	Int-Rw.	Own	W&W	Own	Smith	PG
Exide, Exide	Delco	Bat.	B&B	S-P	B-L	UwE	3	Spicer	M	Timk	1 1/2 F	4.80	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	CAS	W&S	Own	Fors	PG
Exide, Exide	Delco	Bat.	B&B	S-P	B-L	UwE	3	Spicer	M	Timk	1 1/2 F	5.09	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	Smith	OC
Marco, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Spicer	M	Timk	1 1/2 F	4.45	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Lav	W&S	Timk	Own	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Own	M	Own	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	Smith	OC
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Own	M	Own	1 1/2 F	4.89	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	Smith	OC
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Own	M	Own	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	Smith	OC
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.08	S	TA	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	OC
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S	S	1 1/2 E	Ext-Rw	Ext-Rw	Ext-Ds.	Own	W&W	Own	P&B	PG
Willard, Willard	Delco	Bat.	B&B	S-P	Own	UwE	3	Univ.	M	Col.	1 1/2 F	4.50	S</										

ABBREVIATIONS

TRANSMISSION—B. & B.—Borg & Beck; **Mun.**—Muncie; **Detl.**—Detlaff; **Anst.**—Ansted; **North.**—Northway; **B. L.**—Brown & Lipe; **M. & E.**—Merchant & Evans; **Detr.**—Detroit; **Mech.**—Mechanics; **G. L.**—Grant-Lees; **Durs.**—Durstun; **S. P.**—Single Plate; **M. D. D.**—Multiple Dry Disk; **M. D. O.**—Multiple Disk in Oil; **U. w. E.**—Unit with Engine; **Sep. U.**—Separate Unit; **Univ.**—Universal; **Thiem.**—Thiemer; **Th. H.**—Thermo-Hardy; **Hart.**—Hartford; **M.**—Metal; **F.**—Fabric; **M. & F.**—Metal & Fabric; **Flex.**—Flexite; **Timk.**—Timken; **Salis.**—Salisbury; **Col.**—Columbia; **F.**—Floating; $\frac{3}{4}$ **F.**—Three-Quarter Floating; $\frac{1}{2}$ **F.**—Semi-Floating; **S.**—Springs.

RUNNING GEAR—**T. T.**—Torque Tube; **T. A.**—Torque Arm; **S. B.**—Spiral Bevel; **Sp.**—Spur; $\frac{3}{8}$ **E.**—Half Elliptic; $\frac{3}{4}$ **E.**—Three-quarter Elliptic; **T.**— $\frac{1}{2}$ **E.**—Transverse Half Elliptic; **D. T. E.**—Double Transverse Elliptic; $\frac{1}{4}$ **E.**—Quarter Elliptic; **EH.**—Elliptic; **Plat.**—Platform; **Ext.-Rw.**—External Rear Wheels; **Int.-Rw.**—Internal Rear Wheels; **Ext.-Da.**—External Drivehaft; **R. & F.**—Internal Rear & Front Wheels; **War.**—Warner; **Gem.**—Gemmer; **Jac.**—Jacobs; **Dit.**—Ditweiler; **Mun.**—Muncie; **Fost.**—Foster; **Lav.**—Lavine; **Woh.**—Wohlbach; **W. & S.**—Worm & Sector; **W&W**—Worm & Wheel; **S.&N**—Screw & Nut; **Plan.**—Planetary; **B.P.S.**—Bevel Pinion & Sector; **P. & B.**—Parish & Bingham; **Hyd. O.**—Optional.

Mechanical Specifications of 1923 Motor Trucks

1/2—3/4 Ton Trucks

MAKE AND MODEL	GENERAL				ENGINE			ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR					
	Tons Capacity	Chassis Price	Standard Wheel- base (ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor, Make	Ignition System, Make	Generator Make	Starter, Make	Battery, Make	Clutch, Make	Gearset, Make	Universals, Make	REAR AXLE		Front Axle, Make	Steering Gear, Make	Wheels, Make
				Front (ins.)	Rear (ins.)												Make	Total Gear Reduction			
Buick...23-4-SD	¾	\$945	109	P-31x4	P-31x4	Ow.	.....	4-3½x4½	Marvel	Delco..	Delco..	Delco..	Exide..	Own...	Own...	Own...	Own...	4.66	Own...	Jacox...	Own
Chevrolet	1½	510	120	P-30x3½	P-30x3½	Ow.	.....	4-3½x4	Zenith	Remy...	Remy...	Remy...	Willard.	Own...	Muncie.	Own...	Own...	3.77	Own...	Muncie.	Own
Chevrolet.....G	¾	650	120	P-31x4	P-34x4½	Ow.	.....	4-3½x4	Zenith	Remy...	A-L...	A-L...	Willard.	Own...	Muncie.	Own...	Own...	6.33	Own...	Ow.	Hayes
Commerce.....9	¾	1150	126	P-32x4½	P-32x4½	Cont.	N.....	4-3½x5	Zenith	Bosch..	Bijur..	Bijur..	West...	Detr...	Detr...	Univ...	Salis...	5.87	Salis...	Jacox...	Budd
Corbitt.....8	¾	1250	130	P-34x4½	P-34x4½	HS...	7000	4-3½x5	Strom...	Split...	Dyneto.	Dyneto.	Exide...	B-L...	B-L...	Hart...	Shel...	6.00	Shel...	Ross...	Bimel
Denby.....31	¾	1485	130	P-34x4½	P-34x4½	Cont.	7M...	4-3½x5	Strom...	Eisem...	Remy...	Remy...	Willard.	Fuller...	Fuller...	Univ...	Clark...	5.85	Shel...	Ross...	Motor
Dodge Bros.....	¾	730	114	P-32x4	P-32x4	Ow.	.....	4-3½x4½	Stew...	N-E...	N-E...	N-E...	Willard.	Own...	Own...	Own...	Own...	4.16	Own...	Ow.	Kelsey
Dort.....108	¾	685	.....	P-31x4	P-31x4	Lyc...	K.....	4-3½x5	Carter...	Conn...	Bosch...	Bosch...	U-S-L...	Detl...	Own...	Mech...	Flint...	4.45	Flint...	Sag...	Imp
†Gottfredson.20	¾	....	131	P-34x5	P-34x5	Buda	WTU	4-3½x5½	Zenith...	Bosch...	A-K...	A-K...	.....	B-L...	B-L...	Spicer...	Timk...	5.60	Timk...	Gemm...	Dayton
K-Z.....Speed	¾	1500	125	P-33x5	P-33x5	Cont.	N...	4-3½x5	Strom...	Bosch...	Bosch...	Bosch...	Liber...	B-L...	B-L...	Snead...	Timk...	4.90	Timk...	Gemm...	Bimel
Overland...4-D	1½	425	100	P-30x3½	P-30x3½	Ow.	.....	4-3½x4	Till...	Conn...	A-L...	A-L...	U-S-L...	B.&B...	Own...	Own...	Own...	4.50	Own...	Own...	Hayes
Rainier...R-31	¾	....	125	P-35x5	P-35x5	Cont.	N.....	4-3½x5	Zenith...	Eisem...	.....	.....	.....	B-L...	B-L...	Hart...	Timk...	6.75	Timk...	Lavine...	Jones
Republic.....75	¾	1395	124	P-33x5	P-33x5	Lyc...	KB...	4-3½x5	Strom...	A-L...	A-L...	A-L...	U-S-L...	Fuller...	Fuller...	Spicer...	Torb...	5.65	Torb...	Jacox...	Motor
Riddle.....223	¾	....	148	P-33x5	P-33x5	Cont.	8A...	6-3½x5	Strom...	Delco...	Delco...	.....	Willard.	B-L...	B-L...	Blood...	Timk...	.....	Timk...	Ross...	Bimel
Rock Falls...15	¾	....	151	P-35x5	P-35x5	Cont.	6T...	6-3½x5½	Ray...	Bosch...	West...	West...	Exide...	B.&B...	Detr...	Spicer...	Timk...	4.99	Timk...	Gemm...	Mutual
Service.....12	¾	....	128	P-32x4½	P-32x4½	Mid...	409	4-3½x4½	Strom...	Remy...	Remy...	Remy...	Exide...	Hoosier.	Detr...	M. & E.	Timk...	6.11	Own...	Ross...	Bimel
Stoughton....C	¾	1095	131	P-34x4½	P-34x4½	Mid...	410	4-3½x4½	Zenith...	Remy...	Remy...	Remy...	Willard.	Detl...	Camp...	Therm...	Colum...	5.20	Colum...	Lavine...	Royer
United.....15	¾	895	128	P-32x4½	P-32x4½	H-S...	7000	4-3½x5	Zenith	Bosch...	Boech...	Bosch...	West...	Fuller...	Fuller...	Spicer...	Colum...	5.85	Colum...	Lavine...	Bimel
White.....15	¾	2400	133½	P-34x5	P-34x5	Ow.	.....	4-3½x5½	Zenith	.....	L-N*	N-E*	Willard*	Own...	Own...	Own...	Own...	5.36	Own...	Own...	.....
Winther...751	¾	1495	135	P-34x4½	P-35x5	H-S...	7000	4-3½x5	Strom...	West...	West...	West...	Willard...	Warner.	Warner.	Peters...	Torb...	6.60	Torb...	Lavine...	Prud
Yellow CabM22	¾	1590	114	P-33x4½	P-33x4½	Cont.	U4...	4-3½x5	Zenith...	Bosch...	.....	.....	.....	B-L...	B-L...	Spicer...	Timk...	4.90	Timk...	Gemm...	.....

ABBREVIATIONS:**TIRES:**

P—Pneumatic

ENGINE:

Cont.—Continental

H-S—Herschell-Spiller

Lyc—Lycowing

Mid—Midwest

Sp. Pr.—Splash with pressure to main bearings only

Press—Pressure to all bearings excluding wrist joints

FL. P. R.—Pressure to all bearings including wrist pins

Strom—Stromberg

Stew—Stewart

Till—Tillotson

Ray—Rayfield

ELECTRICAL SYSTEM:

Split—Splitdorf

N. E.—North East

Eisem—Eisemann

Conn—Connecticut

A-L Auto-Lite

West—Westinghouse

Liber—Liberty

A-K—Atwater-Kent

*Optional at extra cost.

TRANSMISSION:

Detl—Detlaff

Detr—Detroit

B-L—Brown-Lipe

Cam—Campbell

Univ—Universal

Hart—Hartford

Mech—Mechanics

Therm—Thermoid-Hardy

M. & E.—Merchant & Evans

Salis—Salisbury

Shel—Sheldon

Timk—Timken

Torb—Torbenson

Colum—Columbia

RUNNING GEAR:

Sag—Saginaw

Gemm—Gemm

Prud—Prudden

Detr—Detroit

†—Taken from 1922 specifications

†—Canadian manufacture.

1-1 1/4-1 1/2-1 3/4 Ton Trucks

MAKE AND MODEL	GENERAL				ENGINE				ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR				
	Tons Capacity	Chassis Price	Standard Wheelbase (ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make
				Front (ins.)	Rear (ins.)												Make	Total Gear Reduction			
Ace.....30	1 1/2	\$2400144		S-34x3 1/2	S-34x5	Midw.	412	4-3 1/2 x 5	Zenith	Eisem.	West*	West*	Exide	B-L	B-L	Univ.	Timk	7.75	Timk	Ross	St. M.
Acme.....20	1	129		P-35x5	P-35x5	Cont.	N.	4-3 1/2 x 5	Ray	Eisem.	Bosch	Bosch	Willard	B & B	Cotta	Blood	Timk	6.75	Timk	Ross	Bimel
Acme.....30	1 1/2	129		S-34x3 1/2	S-34x5	Cont.	N.	4-3 1/2 x 5	Ray	Eisem.	Bosch	Bosch*	Willard*	B & B	Cotta	Blood	Timk	7.20	Timk	Ross	Bimel
Armleder.....30	1 1/2	148		S-34x3 1/2	S-34x6	Buda.	GTU	4-4 x 5 1/2	Zenith	Bosch	Bosch*	Bosch*	Exide	B-L	B-L	Spicer	Timk	7.75	Timk	Ross	St. M.
Atterbury.....20R	1 1/2	2475144		S-34x3 1/2	S-34x5	Cont.	J4	4-3 1/2 x 5	Zenith	Eisem.	Delco	Delco	Vesta	Fuller	Fuller	Spicer	Timk	7.75	Timk	Ross	Arch.
Autocar, XXI-UF	12	2200 97		S-34x4	S-34x6	Own.	.....	2-4 1/2 x 4 1/2	Strom	Bosch	.....	.....	.....	Own	Own	Spicer	Own	8.30	Own	Ross	Hoopes
Autocar, XXI-UG	12	2300120		S-34x4	S-34x6	Own.	.....	2-4 1/2 x 4 1/2	Strom	Bosch	.....	.....	.....	Own	Own	Spicer	Own	8.30	Own	Ross	Hoopes
Available.....JH	1 1/2	2450147		S-36x3 1/2	S-36x5	Herc.	O.	4-4 x 5	Zenith	Bosch	Bosch	Bosch	Vesta	B-L	B-L	Spicer	Timk	7.00	Timk	Ross	St. M.
Avery.....1	1	129		P-34x5	P-34x5	Own.	.....	6-3 x 4	Strom	K.W.	West.	West.	Willard	Own	Own	Peters	Own	8.00	Own	Ross	Crane
Beck.....A30	1 1/2	1280132		P-34x4 1/2	P-34x4 1/2	H.S.	7000	4-3 1/2 x 5	Strom	Bosch	Bosch	Bosch	Vesta	Fuller	Fuller	Therm.	I.M.	.....	Shul	Lav	St. M.
Beck.....B30	1 1/2	1350132		P-35x5	P-35x5	Cont.	N.	4-3 1/2 x 5	Strom	Bosch	Bosch	Bosch	Vesta	Fuller	Fuller	Blood	Torb.	7.00	Shul	Lav	St. M.
Bessemer.....G	1	1735124		P-35x5	P-35x5	Cont.	N.	4-3 1/2 x 5	Strom	Bosch	Bijur	Bijur	Prest.	Fuller	Fuller	Arvae	Torb.	7.00	Shul	Ross	Schwa.
Bessemer.....H2	1 1/2	2395144		S-36x3 1/2	S-36x5	Cont.	N.	4-3 1/2 x 5	Strom	Bosch	Bijur	Bijur	Prest.	B & B	Baker	Arvae	L-M.	7.40	Shul	Ross	Schwa.
Bethlehem.....KN	1	1195125		P-35x5	P-35x5	Own.	.....	4-3 1/2 x 5	Zenith	Bosch	G & D	G & D	Prest.	B & B	Det.	Spicer	Eaton	5.88	Eaton	Ross	Jones
†Bridgeport.....A	1 1/2	2350146		S-34x3 1/2	S-34x6	Buda.	WU	4-3 1/2 x 5 1/2	Zenith	Bosch	G & D	G & D	Prest.	B-L	Hart	Wise	7.25	Shul	Ross	Jones	
Brockway.....E2	1	135		P-33x5	P-33x5	Wise.	SU	4-4 x 5	Zenith	Remy	L-N	L-N	Prest.	B-L	B-L	M-E	Colum	5.13	Colum	Gemm	Bimel
Brockway.....S	1 1/2	1404		S-36x4	S-36x6	Wise.	SU	4-4 x 5	Strom	Eisem.	L-N*	L-N*	Prest.	B-L	B-L	Spicer	Timk	7.75	Timk	Gemm	Hoopes
Chevrolet.....T	1	1095125		P-33x4	P-33x5	Own.	.....	4-3 1/2 x 5 1/2	Zenith	Remy	A-L	A-L	Willard	Own	Muncie	Own	Ow.	7.00	Own	Ow.	Hayes
Chicago.....C	1 1/2	144		S-36x3 1/2	C-36x5	Herc.	O	4-4 x 5	Strom	Bosch	Bosch*	Bosch*	Vesta*	B-L	B-L	Peters	Huck	.....	Timk	Gemm	St. M.
Clydesdale.....10	1 1/2	1485138		P-34x5	P-34x5	Cont.	N.	4-3 1/2 x 5	Zenith	Bosch	Bosch	Bosch	Willard	B & B	B-L	Spicer	Timk	6.11	Stand.	Ross	Indes
Commerce.....12	1 1/2	1480130		P-35x5	P-35x5	Cont.	N.	4-3 1/2 x 5	Zenith	Eisem.	Bijur	Bijur	West.	B-L	B-L	Spicer	Torb.	8.00	Salis	Jacox	.....
Corbitt.....E	1	1480130		S-34x3 1/2	S-34x4	Cont.	N.	4-3 1/2 x 5	Strom	Eisem.	Bijur*	Bijur*	Exide*	B-L	B-L	Hart	Sheld.	6.00	Sheld.	Ross	Bimel
Corbitt.....D	1 1/2	2200140		S-34x3 1/2	S-34x5	Cont.	J4	4-3 1/2 x 5	Strom	Eisem.	G & D*	G & D*	Exide*	B-L	B-L	Hart	Sheld.	7.80	Sheld.	Ross	Bimel

1-1¹/₄-1¹/₂-1³/₄ Ton Trucks—(Continued)

MAKE AND MODEL	GENERAL				ENGINE				ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR				
	Tons Capacity	Chassis Price	Standard Wheelbase (ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make
				Front (ins.)	Rear (ins.)												Make	Total Gear Reduction			
Day-Elder AS	1	1600128	P-35x5	P-35x5	Cont. N	N	4-3 1/2 x5	Zenith	Eisem.	Eisem.	West.	Willard	B-L	B-L	Spicer	Sheld.	6.00	Sheld.	Gemm.	Jones	Jones
Day-Elder B	1 1/2	2000144	S-34x3 1/2	S-34x3 1/2	Cont. N	N	4-3 1/2 x5	Zenith	Eisem.	Eisem.	West*	Willard*	B-L	B-L	Spicer	Sheld.	7.80	Torb.	Gemm.	Jones	Jones
Dearborn E	1	1600132	P-35x5	P-35x5	Buda. MU	MU	4-3 1/2 x5 1/8	Strom.	Conn.	Bosch.	Bosch*	Exide	Fuller	Fuller	Pick.	Wise	6.20	Torb.	Ross	Prud.	Prud.
Dearborn F	1 1/2	1980126	S-34x4	S-34x4	Buda. WU	WU	4-3 1/2 x5 1/8	Strom.	Bosch.	Bosch*	Bosch*	Exide*	Fuller	Fuller	Hart.	Wise	6.15	Torb.	Ross	Prud.	Prud.
Defiance G	1	1525128	P-35x5	P-35x5	Cont. N	N	4-3 1/2 x5	Strom.	Conn.	Bosch.	Bosch*	Exide*	B & B	G-L	Spicer	Eaton.	5.85	Sheld.	Ross	St. M.	St. M.
Denby 31	1 1/2	1485130	P-34x4 1/2	P-34x4 1/2	Cont. 7N	7N	4-3 1/2 x5	Strom.	Eisem.	Remy.	Remy	Willard	Fuller	Fuller	Univ.	Clark	5.85	Sheld.	Ross	Motor	Motor
Dependable G1	1 1/2	2350151	P-34x4	C-34x4	Buda. CTU	CTU	4-3 1/2 x5 1/8	Zenith	Split.	A-L*	A-L*	Willard*	Fuller	Fuller	Arvae	Wise	8.00	Sheld.	Ross	Bimel	Bimel
Diamond T 03	1	1975132	S-36x3 1/2	S-36x4	Hink. HAA700	HAA700	4-3 1/2 x5 1/8	Strom.	Bosch.	Bosch*	Bijur*	Exide*	Covert	Covert	Spicer	Own	7.20	Timk	Gemm.	Schw.	Schw.
Diamond T T	1 1/2	2250144	S-36x3 1/2	S-36x5	Hink. HAA700	HAA700	4-3 1/2 x5 1/8	Strom.	Bosch.	Bosch*	Bijur*	Exide*	Covert	Covert	Spicer	Timk	8.25	Timk	Gemm.	Schw.	Schw.
Eugot 752	1	1795	P-34x5	P-34x5	Buda. WTU	WTU	4-3 1/2 x5 1/8	Strom.	West.	West	West	Willard	B-L	B-L	Peters	Timk	6.00	Timk	Ross	Ross	Ross
Fageol S	1 1/2	3000136	S-34x3 1/2	S-34x6	Wauk. BUX	BUX	4-3 1/2 x5 1/8	Zenith	Split	Eisem.	Remy	Exide	B-L	Own	Univ.	Clark	7.80	Eaton	Ross	Motor	Motor
Federal S	1 1/2	1375140	S-36x3 1/2	S-36x5	Cont. J4	J4	4-3 1/2 x5	Zenith	Eisem.	Remy	Remy	Exide	B & B	Own	Peters	Timk	7.20	Own	Gemm.	Motor	Motor
Federal R2	1	132	P-33x5	P-33x5	Cont. J4	J4	4-3 1/2 x5	Zenith	Eisem.	Remy	Remy	Exide	B & B	Detr	Peters	Timk	5.60	Timk	Gemm.	Motor	Motor
Ford TT	1	380123	P-30x3 1/2	P-32x4	Own. Buda.	Buda.	4-3 1/2 x4	Own	Own	Own*	Own*	Own*	Own	Own	Own	Own	7.20	Own	Own	Own	Own
Front Drive	1 1/2	2800120	S-36x5	S-36x4	Buda. CTU	CTU	4-3 1/2 x4 1/2	Zenith	Split	Eisem.	Remy	Exide	B & B	Own	Own	Own	7.00	Own	Ross	Own	Indes
GMC K-16	1	1295132	P-34x5	P-34x5	Own. MA	MA	4-3 1/2 x5 1/4	Marvel	Eisem.	Remy	Remy	Willard	Own	Own	Univ.	Clark	6.00	Own	Jacox	Kelsey	Kelsey
G.W.W. 25B	1 1/2	1485142	P-35x5	P-35x5	Weid. MA	MA	4-3 1/2 x5 1/4	Scheb.	Eisem.	Remy	Remy	Willard	Fuller	Fuller	Aerne	Clark	7.00	Shul	Wohl	Royer	Royer
Garford 15	1	1990135	S-36x3 1/2	S-36x5	Buda. WU	WU	4-3 1/2 x5 1/8	Strom.	Split	A-L*	A-L*	Exide*	Own	Own	Spicer	Timk	7.75	Own	Ross	Motor	Motor
Garford 15	1	1500132	P-34x5	P-34x5	Buda. MU	MU	4-3 1/2 x5 1/8	Strom.	A-K	A-K	A-K	Exide	B & B	Own	Spicer	Timk	6.00	Timk	Jemm.	Motor	Motor
Gary B-E	1-1 1/2	1265140	P-33x4 1/2	P-34x5	Dodge Hink.	Hink.	4-3 1/2 x5 1/4	Stew.	N.E.	N.E.	N.E.	Willard	Dodge	Dodge	Dodge	Dodge	6.25	Own	Dodge	Motor	Motor
Graham 31	1 1/2	3000144	P-36x6	P-38x7	Hink. 400	400	4-4 x5 1/4	Strom.	Bosch.	Bosch.	Bosch.	Exide	B-L	B-L	Spicer	Timk	7.00	Timk	Jemm.	Dayton	Dayton
Gramm-Pioneer10	1	1245129	P-33x5	P-33x5	Lycorn CT	CT	4-3 1/2 x5	Strom.	Conn.	A-L	A-L	Exide	B & B	G-L	Own	Salis	5.75	Salis	Ross	Bimel	Bimel
Gramm-Pioneer15	1 1/2	1750138	S-36x3 1/2	S-36x5d	Cont. N	N	4-3 1/2 x5	Strom.	N.E.	N.E.	N.E.	Exide	Fuller	Fuller	Snead	Clark	6.80	Colum.	Ross	Bimel	Bimel
Gramm-Pioneer65	1 1/2	2250138	S-36x3 1/2	S-36x5d	Cont. J4	J4	4-3 1/2 x5	Strom.	N.E.	N.E.	N.E.	Exide	Fuller	Fuller	Stand	Clark	7.75	Colum.	Ross	Bimel	Bimel
Hal-Fur E	1	2000136	P-34x5	P-34x5	Hink. HAA400	HAA400	4-4 x5 1/4	Strom.	Bosch.	West*	West*	Exide*	M & E	B-L	Peters	Timk	6.00	Timk	Gemm.	Smith	Smith
Hal-Fur G	1 1/2	2350144	P-34x5	P-34x6	Hink. HAA400	HAA400	4-4 x5 1/4	Strom.	Apollo	West*	West*	Exide*	M & E	B-L	Peters	Timk	6.00	Timk	Gemm.	Smith	Smith
Hawkeye K	1 1/2	1850148	S-34x3 1/2	S-34x5	Buda. CTU	CTU	4-3 1/2 x5 1/8	Zenith	Split	Eisem.	Remy	Exide	Fuller	Fuller	Hart	Clark	7.60	Colum.	Ross	Bimel	Bimel
Hendrickson O	1 1/2	2200	S-36x4	S-36x4	Buda. WTU	WTU	4-3 1/2 x5 1/8	Strom.	Split	Eisem.	Remy	Exide	Fuller	Fuller	Pick	Timk	7.00	Timk	Ross	Mead	Mead
Huffman B	1 1/2	1795140	S-34x3 1/2	S-34x6	Cont. N	N	4-3 1/2 x5 1/8	Zenith	Eisem.	Remy	Remy	Exide	Fuller	Fuller	Hart	Amer	9.66	Shul	Lav	Stand	Stand
Huffman C	1 1/2	1695140	S-34x3 1/2	S-34x6	Buda. WC	WC	4-3 1/2 x5 1/8	Zenith	Eisem.	Remy	Remy	Exide	Fuller	Fuller	Hart	Torb.	8.00	Shul	Lav	Stand	Stand
Hug T	1 1/2	1350118	P-34x5	P-34x5	Buda. MU	MU	4-3 1/2 x5 1/8	Zenith	Split	Eisem.	Remy	Exide	Fuller	Fuller	Blood	Clark	5.50	Colum.	Ross	Stand	Stand
Indiana 10	1	180	P-34x5	P-34x5	Wauk. BUX	BUX	4-3 1/2 x5 1/4	Zenith	Bosch.	Bosch.	Bosch.	Willard	B & B	B-L	Peters	Timk	6.11	Timk	Ross	Indat	Indat
Indiana 12	1 1/2	146	S-34x3	S-34x5	Wauk. F45	F45	4-3 1/2 x5 1/4	Strom.	Eisem.	Remy	Remy	Exide	B-L	B-L	Spicer	Sheld.	7.80	Sheld.	Wohl	Opt	Opt
International S	1	1250124	P-32x4	P-32x4	Own. P45	P45	4-3 1/2 x5	Ensign	Conn.	A-L	A-L	Exide	Muncie	Muncie	Snead	Own	6.30	Own	C.A.S.	Own	Own
International 21	1	1550115	S-36x3 1/2	S-36x3 1/2	Own. P45	P45	4-3 1/2 x5	Ensign	Conn.	A-L	A-L	Exide	Muncie	Muncie	Snead	Own	6.86	Own	Own	Own	Own
International 31	1 1/2	1650128	S-36x3 1/2	S-36x5	Own. P45	P45	4-3 1/2 x5 1/4	Ensign	Conn.	A-L	A-L	Exide	Muncie	Muncie	Snead	Own	7.91	Own	Own	Own	Own
K-Z 1	1	1750134	S-34x3	S-34x5	Cont. N	N	4-3 1/2 x5	Strom.	Bosch.	Bosch*	Bosch*	Liberty*	B-L	B-L	Snead	Timk	7.20	Timk	Gemm.	St. M.	St. M.
K-Z 1 1/2	1 1/2	2075134	S-34x4	S-34x6	Cont. N	N	4-3 1/2 x5	Strom.	Bosch.	Bosch*	Bosch*	Liberty*	B-L	B-L	Snead	Timk	8.75	Timk	Gemm.	St. M.	St. M.
Kalamazoo T	1	1295134	P-34x5	P-34x5	Her. O	O	4-4 x5	Strom.	Eisem.	Bosch*	Bosch*	Exide*	B-L	B-L	Snead	Timk	8.75	Timk	Gemm.	St. M.	St. M.
Kalamazoo G1	1 1/2	1800144	S-34x4	S-34x5	Cont. N	N	4-3 1/2 x5	Strom.	Cont.	Dyneto	Dyneto	Willard	M & E	Camp.	Blood	Flint	5.20	Flint	Lav	Stand	Stand
Kearns H	1	1150118	P-33x5	P-33x5	H-S 7000	7000	4-3 1/2 x5	Zenith	Bosch.	Dyneto	Dyneto	Willard	Fuller	Fuller	M & E	Colum.	7.00	Sheld.	Lav	Bimel	Bimel
Kelly Sp'd K340	1 1/2	2700144	S-36x3 1/2	S-36x6	Own. K-30	K-30	4-3 1/2 x5 1/4	Zenith	Eisem.	Delco	Delco	Willard	B & B	Cott	Peters	Timk	8.50	Sheld.	Lav	Bimel	Bimel
Kiesel 1	1	1585140	P-34x5	P-34x5	Own. K-30	K-30	4-3 1/2 x5 1/4	Zenith	Eisem.	Delco	Delco	Willard	B & B	Cott	Peters	Timk	8.50	Sheld.	Lav	Bimel	Bimel
Kiesel 1 1/2	1 1/2	1975152	S-36x3 1/2	S-36x6	Own. K-30	K-30	4-3 1/2 x5 1/4	Zenith	Eisem.	Delco	Delco	Willard	B & B	Cott	Peters	Timk	8.50	Sheld.	Lav	Bimel	Bimel
Kleiber 1	1 1/2	2400130	S-34x3 1/2	S-34x6	Cont. J4	J4	4-3 1/2 x5	Strom.	Bosch.	Bosch	Bosch	Exide	B-L	B-L	Spicer	Timk	6.20	Timk	Ross	Smith	Smith
Kleiber 1 1/2	1 1/2	2800143	S-36x4	S-36x7	Cont. K4	K4	4-4 x5 1/4	Strom.	Bosch.	Bosch	Bosch	Exide	B-L	B-L	Spicer	Timk	7.75	Timk	Ross	Smith	Smith
Koehler D	1 1/2	1985137	P-34x3 1/2	S-34x5	H-S 7000	7000	4-3 1/2 x5	Zenith	Split	West	West	Exide	Mech	Mech	M & E	Own	7.25	Shul	Lav	Jones	Jones
Krebs 24	1	1675140	P-34x5	P-34x5	Cont. J4	J4	4-3 1/2 x5	Zenith	Bosch.	Bosch	Bosch	Willard	B-L	B-L	Spicer	Timk	6.20	Timk	Ross	Smith	Smith
Krebs 45	1 1/2	2275160	S-36x4	S-36x7	Cont. K4	K4	4-4 x5 1/4	Zenith	Bosch.	Bosch*	Bosch*	Willard*	B-L	B-L	Spicer	Timk	8.75	Timk	Ross	Smith	Smith
Larrabee X2	1 1/2	1865138	P-34x5	P-34x5	Cont. 8R	8R	6-3 1/2 x4 1/2	Zenith	Bosch.	Bosch	Bosch	Exide*	B-L	B-L	Snead	Salis	5.75	Salis	Gemm.	Indeat	Indeat
Larrabee J	1 1/2	2400132	P-34x3 1/2	S-34x5	Cont. J4	J4	4-3 1/2 x5	Zenith	Bosch.	Bosch	Bosch	Exide	B-L	B-L	Snead	Sheld	7.75	Sheld	Gemm.	Smith	Smith
Luedinghaus C	1	1690130	P-35x5	P-35x5	H-S 7000	7000	4-3 1/2 x5	Scheb.	Split	Dyneto	Dyneto	Exide	B & B	G-L	Spicer	Wise	7.75	Shul	Gemm.	Bimel	Bimel
Luedinghaus W	1 1/2	2490145	S-34x3	S-34x5	Wauk. BUX	BUX	4-3 1/2 x5 1/4	Scheb.	Split	Dyneto	Dyneto	Exide	B & B	Detr	Spicer	Wise	7.75	Colum.	Lav	Stand	Stand
Macfar L-2	1 1/2	150	S-36x4	S-36x6	Cont. K4	K4	4-4 x5 1/4	Strom.	Eisem.	Bosch*	Bosch*	Presto*	B-L	B-L	Spicer	Timk	8.75	Timk	Ross	Dayton	Dayton
Mapleleaf EXP	1 1/2	3000144	P-34x5	P-36x6	Hink. HAA300	HAA300	4-3 1/														

1-1/4-1-1/2-1-3/4 Ton Trucks—Continued

MAKE AND MODEL	GENERAL				ENGINE				ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR				
	Tons Capacity	Chassis Price	Standard Wheelbase (ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make
				Front (ins.)	Rear (ins.)												Make	Total Gear Reduction			
Rumely.....A	1 1/2	\$1995144	S-34x3 1/2	S-36x5	Buda.	CTU.....	4-3 1/2x5 1/4	Strom.....	Split.....	Bosch.....	Bosch.....	Exide.....	Fuller.....	Fuller.....	Blood.....	Sheld.....	7.80	Shul.....	Gemm.....	Motor.....	
Sanford.....15	1 1/2	2150132	S-36x3 1/2	S-36x5	Cont.....	N.....	4-3 1/2x5	Zenith.....	Eisem.....	Dyneto.....	Dyneto.....	Prest.....	B-L.....	B-L.....	Spicer.....	Sheld.....	6.50	Sheld.....	Ross.....	Indes.....	
Selden.....A	1 1/2	2360137 1/2	S-34x3 1/2	S-34x5	Cont.....	N.....	4-3 1/2x5	Strom.....	Eisem.....	N.E.*.....	N.E.*.....	Willard.....	B-L.....	B-L.....	Spicer.....	Eaton.....		Timk.....	Lav.....	Arch.....	
Service.....25	1 1/2	132	P-34x5	P-34x5	Buda.....	WTU.....	4-3 1/2x5 1/2	Zenith.....	Remy.....	Remy.....	Remy.....	Exide.....	B-L.....	B-L.....	M. & E.....	Timk.....	5.85	Shul.....	Ross.....	Bimel.....	
Service.....21	1 1/2	137	S-34x3 1/2	S-34x5	Buda.....	WTU.....	4-3 1/2x5 1/2	Strom.....	Eisem.....	West.....	West.....	Willard.....	Fuller.....	Fuller.....	M. & E.....	Timk.....	7.75	Timk.....	Ross.....	Bimel.....	
Signal.....NF	1 1/2	132	P-34x5	P-36x6	Cont.....	J4.....	1-3 1/2x5	Strom.....	Eisem.....	Delco*.....	Delco*.....	Willard*.....	B-L.....	B-L.....	Univ.....	Timk.....	7.20	Timk.....	Ross.....	St. M.....	
Standard.....79	1 1/2	1330134	P-33x5	P-33x5	Cont.....	N.....	1-3 1/2x5	Strom.....	Eisem.....	Eisem*.....	Bosch*.....	Willard.....	B-L.....	B-L.....	Spicer.....	Timk.....	5.60	Timk.....	Ross.....	Detr.....	
Standard.....J-K	1 1/2	1600134	S-34x3 1/2	C-34x5	Cont.....	N.....	1-3 1/2x5	Strom.....	Eisem.....	Eisem*.....	Bosch*.....	Willard*.....	B-L.....	B-L.....	Spicer.....	Timk.....	7.20	Timk.....	Ross.....		
Sterling.....1	1 1/2	2885142	S-36x3 1/2	S-36x5	Wauk.....	FU.....	4-4 x5 1/2	Zenith.....	Eisem.....	Bosch*.....	Bosch*.....	Gould*.....	B-L.....	B-L.....	Univ.....	Timk.....	7.00	Timk.....	Ross.....	Prud.....	
Stewart.....15	1 1/2	1445130	P-35x5	P-35x5	Buda.....	MU.....	4-3 1/2x5 1/2	Zenith.....	Remy.....	Remy*.....	Remy*.....	West.....	B. & B.....	Fuller.....	Spicer.....	Clark.....		Colum.....	Ross.....	Fire.....	
Stewart.....14X	1 1/2	128	P-34x4 1/2	P-34x4 1/2	Buda.....	MU.....	4-3 1/2x5 1/2	Zenith.....	Remy.....	Remy*.....	Remy*.....	West.....	B. & B.....	Fuller.....	Spicer.....	Clark.....		Colum.....	Ross.....	Fire.....	
Stewart.....9	1 1/2	1790154	S-34x3 1/2	S-34x6	Cont.....	N.....	4-3 1/2x5	Zenith.....	Remy.....	Remy*.....	Remy*.....	Willard.....	B-L.....	B-L.....	Hart.....	Clark.....		Colum.....	Gemm.....		
Stoughton.....A	1 1/2	1790130	P-34x5	P-34x5	Wauk.....	BUX.....	4-3 1/2x5 1/2	Strom.....	Eisem.....	Dyneto*.....	Dyneto*.....	Willard*.....	B-L.....	B-L.....	Therm.....	Sheld.....	6.00	Sheld.....	Lav.....	Royer.....	
Stoughton.....B	1 1/2	2150140	S-36x3 1/2	S-36x5	Wauk.....	BUX.....	4-3 1/2x5 1/2	Strom.....	Eisem.....	Dyneto*.....	Dyneto*.....	Willard*.....	B-L.....	B-L.....	Therm.....	Sheld.....	7.80	Sheld.....	Lav.....	Royer.....	
Superior.....D	1 1/2	1650124	S-36x3 1/2	S-36x5	Cont.....	N.....	4-3 1/2x5	Strom.....	Eisem.....	West*.....	West*.....	Willard*.....	Fuller.....	Fuller.....	Arvae.....	Torb.....		DD.....	Torb.....	Ross.....	
Tiffin.....GW	1 1/2	2100135	S-36x3 1/2	S-36x5	Cont.....	C4.....	4-4 1/2x5 1/2	Scheb.....	Bosch.....	Eisem*.....	West*.....	Willard.....	Fuller.....	Fuller.....	Peters.....	Sheld.....	7.75	Sheld.....	Ross.....	Smith.....	
Thomson.....20	1 1/2	1795134	P-34x5	P-34x5	Hink.....	HAA400	4-4 x5 1/2	Strom.....	West.....	West.....	West.....	Willard.....	Warner.....	Warner.....	Snead.....	Eaton.....	5.13	Stand.....	Ross.....	Bimel.....	
Tower.....J	1 1/2	2900142	P-35x5	P-38x7	Cont.....	C4.....	4-4 1/2x5 1/2	Option.....					Fuller.....	Fuller.....	Blood.....	Timk.....	7.25	Shu.....	Ross.....		
Traffic.....1	1 1/2	1595128	P-35x5	P-35x5	Cont.....	N.....	4-3 1/2x5	Carter.....	Bosch.....	G. & D.....	G. & D.....	Willard.....	Cover.....	Cover.....	Therm.....	Russel.....	6.15	Lwn.....	Own.....	Dayton.....	
Transport.....15	1 1/2	1295128	P-32x4 1/2	P-32x4 1/2	Cont.....	N.....	4-3 1/2x5	Zenith.....	Remy.....	Remy.....	Remy.....	Willard.....	Fuller.....	Fuller.....	Snead.....	Colum.....	5.10	Colum.....	Lav.....	Motor.....	
Transport.....25	1 1/2	1495130	S-34x3 1/2	S-34x5	Buda.....	WTU.....	4-3 1/2x5 1/2	Strom.....	Eisem.....	Eisem.....	Remy*.....	Willard.....	Fuller.....	Fuller.....	Snead.....	Clark.....	7.25	Colum.....	Jacob.....	Motor.....	
Traylor.....B	1 1/2	2390140	S-34x3 1/2	S-34x6	Buda.....	WTU.....	4-3 1/2x5 1/2	Zenith.....	Split.....	West.....	West.....	Willard.....	Cover.....	Cover.....	M. & E.....	Sheld.....	7.66	Sheld.....	Ross.....	Schw.....	
Triangle.....AA	1 1/2	1285123	P-34x4 1/2	P-34x4 1/2	H.S.....	7000	4-3 1/2x5	Strom.....	N.E.....	N.E.....	N.E.....	Exide.....	Fuller.....	Fuller.....	Univ.....	Clark.....	6.25	Torb.....	Gemm.....	North.....	
Triangle.....A	1 1/2	1985144	S-34x4	S-34x7	Wauk.....	BUX.....	4-3 1/2x5 1/2	Strom.....	Eisem.....	Eisem.....	N.E.*.....	Exide.....	Fuller.....	Fuller.....	Univ.....	Clark.....	7.25	Colum.....	Gemm.....	North.....	
United Motors. 30	1 1/2	1445148	P-34x5	P-34x5	Herc.....	O.....	4-4 x5	Zenith.....	Bosch.....	Bosch.....	Bosch.....	West.....	B-L.....	B-L.....	Spicer.....	Colum.....		Colum.....	Lav.....	Bimel.....	
United Motors. 35	1 1/2	1595148 1/2	P-34x5	S-34x6	Herc.....	O.....	4-4 x5	Zenith.....	Bosch.....	Bosch.....	Bosch.....	West.....	B-L.....	B-L.....	Spicer.....	Wisc.....	7.00	Colum.....	Lav.....	Bimel.....	
United States. U	1 1/2	1575138	P-34x5	P-34x5	Buda.....	MU.....	4-3 1/2x5 1/2	Strom.....	Bosch.....	Bosch.....	Bosch.....	Presto.....	Fuller.....	Fuller.....	Blood.....	Clark.....	6.25	Shul.....	Lav.....	Schw.....	
United Sts. NW23	1 1/2	2375144	S-36x4	S-36x6	Buda.....	MTU.....	4-3 1/2x5 1/2	Strom.....	Bosch.....	Bosch.....	Bosch.....	Presto.....	Fuller.....	Fuller.....	Blood.....	Sheld.....	7.80	Shul.....	Lav.....	Schw.....	
United States. N	1 1/2	1775144	S-36x3 1/2	S-36x5	Cont.....	N.....	4-3 1/2x5	Strom.....	Bosch.....	Bosch.....	Bosch.....	Presto.....	Fuller.....	Fuller.....	Blood.....	Clark.....	7.60	Shul.....	Lav.....	Schw.....	
United States. N	1 1/2	1975144	S-36x3 1/2	S-36x5	Cont.....	N.....	4-3 1/2x5	Strom.....	Bosch.....	Bosch.....	Bosch.....	Presto.....	Fuller.....	Fuller.....	Blood.....	Sheld.....	7.80	Shul.....	Lav.....	Schw.....	
Vellie.....46	1 1/2	1585133	S-36x3 1/2	S-36x5	Cont.....	N.....	4-3 1/2x5	Strom.....	A-K.....	Bijur.....	Bijur.....	Willard.....	B. & B.....	Durst.....	Arvae.....	Torb.....	8.10	Colum.....	Ross.....	Mutual.....	
Veteran.....E	1 1/2	3500186	P-34x5	P-34x5	Buda.....	CTU.....	4-3 1/2x5 1/4	Zenith.....					B. & B.....	Cotta.....	Spicer.....	Sheld.....	6.50	Sheld.....	Ross.....	Smith.....	
Walker-Johnson. D	1	132	P-34x5	P-36x6	Midw.....	412	4-3 1/2x5	Zenith.....	Remy.....	Remy.....	Remy.....	Presto.....	Fuller.....	Fuller.....	Spicer.....	Timk.....	7.20	Timk.....	Ross.....	Jones.....	
Watson.....1	1	1465128	P-34x5	P-34x5	Buda.....	MU.....	4-3 1/2x5 1/2	Zenith.....	Simms.....	Dyneto.....	Dyneto.....	Exide.....	B-L.....	B-L.....	Spicer.....	Timk.....	6.25	Colum.....	Lav.....	Vans.....	
Western.....L	1 1/2	2400148	S-36x3 1/2	S-36x5	Buda.....	CTU.....	4-3 1/2x5 1/2	Strom.....	Bosch.....	Bosch*.....	Bosch*.....	Vesta*.....	Fuller.....	Fuller.....	Spicer.....	Timk.....	7.00	Timk.....	Ross.....	Prud.....	
Western.....W	1 1/2	2800148	S-36x3 1/2	S-36x5	Cont.....	C4.....	4-4 1/2x5 1/2	Strom.....	Bosch.....	Vesta*.....	Vesta*.....	Willard.....	Fuller.....	Fuller.....	Spicer.....	Wisc.....	7.25	Schu.....	Lav.....	Prud.....	
Wichita.....K	1	2300144	S-36x3 1/2	P-36x4	Wauk.....	BX.....	4-3 1/2x5 1/2	Strom.....	Eisem.....	N.E.*.....	N.E.*.....	Vesta*.....	Own.....	B-L.....	Own.....	Sheld.....	7.80	Sheld.....	Ross.....	Bimel.....	
Wilcox.....AA	1	1900130	S-35x5	S-35x5	Buda.....	CTU.....	4-3 1/2x5 1/2	Strom.....	Bosch.....	West*.....	West*.....	Phila*.....	B-L.....	B-L.....	Spicer.....	Russel.....	5.25	Shul.....	Gemm.....	Bimel.....	
Wilcox.....BB	1 1/2	2550144	S-36x6	S-38x7	Own.....	SU.....	4-4 1/2x5	Strom.....	Bosch.....	West*.....	West*.....	Phila*.....	B. & B.....	Own.....	Blood.....	Wohler.....	7.90	Schu.....	Own.....	Clark.....	
Winther.....752	1 1/2	1795135	P-34x5	P-34x5	Wisc.....	CAU.....	4-4 x5	Strom.....	A-L.....	A-L.....	A-L.....	Willard.....	Fuller.....	Fuller.....	Peters.....	Timk.....	6.25	Timk.....	Ross.....	Bimel.....	
Winther.....39	1 1/2	1950140	S-34x3 1/2	S-34x5	Wisc.....	CAU.....	4-3 1/2x5	Strom.....	Eisem.....	West*.....	West*.....	Willard*.....	Fuller.....	Fuller.....	Arvae.....	Own.....	6.80	Colum.....	Lav.....	Own.....	
Winther.....430	1 1/2	2550132	S-32x4	S-32x4	Wisc.....	CAU.....	4-3 1/2x5	Strom.....	Eisem.....	West*.....	West*.....	Willard*.....	Fuller.....	Fuller.....	Peters.....	Own.....	8.80	Own.....	Lav.....	Own.....	
Wisconsin.....B	1	1795136	P-34x5	P-34x5	Cont.....	J4.....	4-3 1/2x5	Strom.....	Bosch.....	Bosch.....	Bosch.....	Exide.....	B-L.....	B-L.....	Spicer.....	Timk.....	6.75	Cont.....	Lav.....	Bimel.....	
Wisconsin.....C	1 1/2	2100144	P-34x5	P-36x6	Cont.....	J4.....	4-3 1/2x5	Strom.....	Bosch.....	Bosch*.....	Bosch*.....	Exide*.....	B-L.....	B-L.....	Spicer.....	Timk.....	8.25	Cont.....	Lav.....	Bimel.....	
Witt-Will.....N	1 1/2	2450144	S-36x3 1/2	S-36x5	Cont.....	K4.....	4-4 1/2x5 1/2	Strom.....	Eisem.....	Eisem.....		Lyon.....	B-L.....	B-L.....	Spicer.....	Timk.....	7.00	Timk.....	Ross.....	Arch.....	
Yellow Cab.....42	1 1/2	1640130	P-35x5	P-35x5	Cont.....	U4.....	4-3 1/2x5	Zenith.....	Bosch.....				B-L.....	B-L.....	Spicer.....	Timk.....		Timk.....	Gemm.....		

ABBREVIATIONS:

††—Taken from 1922 specifications
†—Canadian Manufactured

TIRES:

S.—Solid
P.—Pneumatic
C.—Cushion
S*—Pneumatics Optional at extra cost

ENGINE:

Midw.—Midwest
Cont.—Continental
H.S.—Herschell-Spillman
Wisc.—Wisconsin
Herc.—Hercules

Hink.—Hinkley

Lycm.—Lycmington

Weld.—Weidley

Wauk.—Waukegan

FL. PR.—Pressure to all bearings including wrist pins

SP. PR.—Splash with pressure to main bearings

Press.—Pressure to main bearings only

Ray.—Rayfield

Strom.—Stromberg

Scheb.—Schebler

Tillot.—Tillotson

Stew.—Stewart

McC.—McCanna

Mon.—Monarch

ELECTRICAL SYSTEM:

Eisem.—Eisemann

Conn.—Connecticut

Split.—Splitdorf

A.-K.—Atwater-Kent

A.-L.—Auto-Lite

West.—Westinghouse

N. E.—North East

Mag.—Magneo

Bat.—Battery

L.-N.—Leeco-Neville

G. & D.—Gray & Davis

Prest.—Prest-O-Lite

Phila.—Philadelphia

TRANSMISSION:

B.L.—Brown-Lipe

B. & B.—Borg & Beck

Detr.—Detroit

G.-L.—Grant-Lee

M. & E.—Merchant & Evans

Mech.—Mechanics

Hoos.—Hoosier

Camp.—Campbell

Durst.—Durst

Univ.—Universal

Therm.—Thermoid-Hardy

Hart.—Hartford

Opt.—Optional at extra cost

Timk.—Timken

I. M.—Iron Mountain

Torb.—Torbenson

Colum.—Columbia

Sheld.—Sheldon

Wisc.—Wisconsin

Salis.—Salisbury

Dunk.—Dunkirk

Shul.—Shuler

D. R.—Double Reduction

I. G.—Internal Gear

W.—Worm

S. B.—Straight Bevel

S. P.—Spiral Bevel

F.—Floating

1/2 F.—Semi-Floating

3/4 F.—Three-quarter Floating

DD.—Dead

RUNNING GEAR:

Lav.—Lavine

Gemm.—Gemmer

St. M.—St. Marys

Arch.—Archibald

Indes.—Indestructible

Prud.—Prudden

Schw.—Schwartz

Stand.—Standard

E. & O.—Eberly & Oris

Detr.—Detroit

Hydr.—Hydraulic

2-2½-3-3½-4-4½ Ton Trucks—(Continued)

MAKE AND MODEL	GENERAL				ENGINE				ELECTRICAL SYSTEM				TRANSMISSION			RUNNING GEAR						
	Tons Capacity	Chassis Price	Standard Wheelbase (ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make	
				Front (ins.)	Rear (ins.)												Make	Total Gear Reduction				
Autocar.....27H	2-3	\$3100	114	S-34x5	S-36x7	Own		4-4 x5½	Strom.	Bosch	L-N*	L-N*	Exide*	Own	Own	Spicer	Own	7.72	Own	Ross	Hoopes	
Autocar.....27K	2-3	3200	138	S-34x5	S-36x7	Own		4-4 x5½	Strom.	Bosch	L-N*	L-N*	Exide*	Own	Own	Spicer	Own	7.72	Own	Ross	Hoopes	
Available.....H	2½	3160	152	S-36x4	S-36x8	Here	CU3	4-4 x5½	Strom.	Bosch	Bosch*	Bosch*	Vesta	B-L	B-L	Spicer	Timk	8.50	Timk	Ross	St. M.	
Available.....H	3½	4175	178	S-36x5	S-40x5d	Here	MU3	4-4½ x5½	Strom.	Bosch	Bosch*	Bosch*	Vesta	B-L	B-L	Spicer	Timk	10.33	Timk	Ross	St. M.	
Beck.....C40	2½	2250	144	P-38x7	P-40x8	Cont.	4C	4-4½ x5½	Strom.	Bosch	Bosch*	Bosch*		Fuller	Fuller	Blood	Clark	9.00	Schul	Lav	St. M.	
Bessemer.....J2	2½	2595	158	S-36x4	S-34x4d	Cont.	C2	4-4½ x5½	Strom.	Eisem	Eisem		Presto	B-L	B-L	Arvac	LM	6.50	Schul	Ross	Schwar	
Bessemer.....K2	4	3495	175	S-36x5	S-36x10	Cont.	E7	4-4½ x5½	Strom.	Eisem	Eisem		Presto	B-L	B-L	Spicer	Torb	10.25	Schul	Ross	Smith	
Bethlehem.....GN	2	1795	137	S-34x4	C-34x6	Own		4-4 x5½	Zenith	Bosch	G.D.	G.D.		Presto	B-L	B-L	Univ	Wise	7.75	Shel	Lav	Smith
Bethlehem.....HN	3	2495	143	S-36x4	S-36x4d	Own		4-4 x5½	Zenith	Bosch	G.D.	G.D.		Presto	Fuller	Fuller	Univ	Wise	7.75	Shel	Lav	Smith
Bridgeport.....B	2½	2850	156	S-36x4	S-36x4d	Buda	HTU	4-4½ x5½	Strom.	Eisem				Presto	B-L	B-L	Hart	Eat	7.25	Schul	Ross	Jones
Bridgeport.....C	3	3850	170	S-36x5	S-36x10	Buda	YTU	4-4½ x5½	Strom.	Eisem				Presto	B-L	B-L	Hart	Eat	10.25	Schul	Ross	Jones
Brookway.....K	2½	153		S-36x4	S-36x8d	Cont.	K4	4-4½ x5½	Strom.	Eisem	Dyneto	Dyneto	Presto*	B-L	B-L	Spicer	Timk	7.75	Timk	Gemm	Hoopes	
Brookway.....R	3½	164		S-36x5	S-36x5d	Cont.	L4	4-4½ x5½	Strom.	Eisem	Dyneto	Dyneto	Presto*	B-L	B-L	Spicer	Timk	8.75	Timk	Gemm	Smith	
Buffalo.....6	2½	3400	155	S-34x5	S-36x5d	Here	CU3	4-4 x5½	Strom.	Bosch	Bosch	Bosch	Exide	Covert	Covert		Shel	8.75	Shel	Ross	Jones	
Case.....TR	2	144		P-36x6	P-38x7	Own		4-4½ x5½	Bennett	Eisem	Eisem		Willard	Twin	Own	Peters	Torb	8.00	Torb	Ross	St. M.	
Chicago.....C	2½	157½		S-36x4	S-36x7	Here	O	4-4 x4	Strom.	Bosch	Bosch*	Bosch*	Vesta	B-L	B-L	Peters	Huck		Timk	Gemm	Stand	
Chicago.....C	3½	156		S-36x5	S-36x10	Here	MU3	4-4½ x5½	Strom.	Bosch	Bosch*	Bosch*	Vesta	B-L	B-L	Peters	Huck		Timk	Gemm	Stand	
Clydesdale.....E	2	2650	156	S-36x4	S-36x7	Cont.	K4	4-4½ x5½	Zenith	Bosch	Bosch*	Bosch*	Willard	B-L	B-L	Spicer	Timk		Timk	Ross		
Commerce.....25	2½	2425	156	S-36x6	S-40x8	Cont.	K4	4-4½ x5½	Zenith	Eisem	Bijur	Bijur	West	B-L	B-L	Univ	Clark	7.75	Timk	Ross		
Concord.....A	2	2950	140	S-36x3½	S-36x6	Buda	ITU	4-4 x5½	Zenith	Eisem	West	West	Exide	B-L	B-L	Spicer	Timk	7.75	Timk	Ross	Arch	
Concord.....B	3	3600	150	S-36x4	S-36x8	Buda	HTU	4-4½ x5½	Zenith	Eisem	West	West	Exide*	B-L	B-L	Spicer	Timk	9.25	Timk	Ross	Arch	
Cook.....51	2½	168		P-36x6	P-40x8	Here	CU3	4-4½ x5½	Split	West	West	Willard	B-L	B-L	Own	Opt	7.00	Timk	Wohb			
Corbitt.....C	2	2600	148	S-36x3½	S-36x7	Cont.	C4	4-4½ x5½	Strom.	Eisem	G.D.	G.D.	Exide*	B-L	B-L	Hart	Shel	8.66	Shel	Ross	Bimel	
Corbitt.....B	2½	3000	152	S-36x4	S-36x7	Cont.	K4	4-4½ x5½	Strom.	Eisem	G.D.	G.D.	Exide*	B-L	B-L	Hart	Shel	8.75	Shel	Ross	Bimel	
Day-Elder.....C	2½	2750	150	S-36x4	S-36x7	Buda	HTU	4-4½ x5½	Zenith	Eisem	Bosch	West	Willard	Covert	Covert	Hart	Shel	8.75	Shel	Gemm	Jones	
Day-Elder.....D	2½	2400	144	S-36x4	S-36x7	Cont.	C2	4-4½ x5½	Zenith	Eisem	Eisem	West	Willard	Covert	Covert	Hart	Shel	8.66	Colum	Gemm	Jones	
Day-Elder.....F	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....G	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....H	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....I	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....J	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....K	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....L	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....M	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....N	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....O	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....P	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....Q	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....R	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....S	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....T	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....U	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....V	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....W	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....X	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....Y	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....Z	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AA	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AB	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AC	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AD	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AE	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AF	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AG	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AH	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AI	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AJ	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AK	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart	Shel	10.25	Colum	Gemm	Jones	
Day-Elder.....AL	3½	3200	165	S-36x5	S-36x5d	Cont.	E4	4-4½ x5½	Zenith	Eisem	Eisem		Willard	B-L	B-L	Hart						

2-2½-3-3½-4-4½ Ton Trucks—Continued

MAKE AND MODEL	GENERAL				ENGINE				ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR				
	Tons Capacity	Chassis Price	Standard Wheel-base (ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make
				Front (ins.)	Rear (ins.)												Make	Total Gear Reduction			
Kimball.....AC	2-3	\$3675	158	S-36x5	S-36x5d	Wisc.	UAU.	4-4½x6	Zenith.	Split.	Split.	West.	Willard.	B-L.	B-L.	Peters.	Shel.	7.75	Shel.	Ross.	Smith.
Kimball.....AM	4	4550	164	S-36x6	S-40x7d	Wisc.	VAU.	4-4½x6	Zenith.	Split.	Split.	West.	Willard.	B-L.	B-L.	Peters.	Shel.	8.75	Shel.	Ross.	Smith.
Kimball.....K	2½	2875	168	C-36x4	S-36x8	Own.	...	4-4½x5½	Strom.	...	...	...	...	Warn.	Warn.	Spicer.	Shel.	8.50	Shel.	Ross.	Prud.
Kleiber.....	2½	3675	168	S-36x5	S-36x12	Own.	...	4-4½x5½	Strom.	...	...	...	...	Warn.	Warn.	Spicer.	Shel.	11.75	Shel.	Ross.	Smith.
Kleiber.....	2½	3600	160	S-36x5	S-36x10	Cont.	L4.	4-4½x5½	Strom.	Bosch.	Bosch.	Bosch.	...	B-L.	B-L.	Spicer.	Shel.	8.50	Shel.	Ross.	Smith.
Kleiber.....	2½	4600	163	S-36x5	S-36x12	Cont.	L4.	4-4½x5½	Strom.	Bosch.	Bosch.	Bosch.	...	B-L.	B-L.	Spicer.	Shel.	10.33	Shel.	Ross.	Smith.
Koehler.....M	2½	3175	165	S-36x4	S-36x7	Herc.	CU3.	4-4 x5½	Zenith.	Split.	West.	...	Exide.	B-L.	B-L.	Spicer.	Shel.	9.25	Schul.	Lav.	Wayne.
Koehler.....F	3	4150	162	S-36x5	S-36x5d	Herc.	MU3.	4-4½x5½	Zenith.	Split.	West.	...	Exide.	B-L.	B-L.	Spicer.	Shel.	10.33	Schul.	Lav.	Dayton.
Krebs.....75	2½	2550	163	S-36x4	S-36x8d	Cont.	L4.	4-4½x5½	Zenith.	Bosch.	Bosch.	Bosch.	Willard.	B-L.	B-L.	Spicer.	Shel.	9.25	Shel.	Ross.	Smith.
Krebs.....110	2½	3175	170	S-36x5	S-40x10d	Cont.	L4.	4-4½x5½	Zenith.	Bosch.	Bosch.	Bosch.	Willard.	B-L.	B-L.	Spicer.	Shel.	10.33	Shel.	Ross.	Smith.
Krebs. 110 Special	2½	...	170	S-36x5	S-40x10d	Cont.	B2.	4-4½x6	Zenith.	Bosch.	Bosch.	Bosch.	Willard.	B-L.	B-L.	Spicer.	Shel.	10.33	Shel.	Ross.	Smith.
L.M.C.....2-20	2½	1750	164	S-36x4	S-36x4	Cont.	C2.	4-4½x5½	Strom.	Bosch.	...	...	...	B & B.	B-L.	Baker.	Russ.	8.80	Schul.	Lav.	Bimel.
Lange.....E	2½	3450	153	S-36x4	S-36x7	Cont.	K4.	4-4½x5½	Strom.	Bosch.	...	...	...	B-L.	B-L.	Peters.	Shel.	9.25	Shel.	Ross.	Hoopes.
Larabee.....K5	2½	2400	158	S-36x4	S-36x8	Cont.	L4.	4-4½x5½	Zenith.	Bosch.	Bosch.	Bosch.	Exide.	B-L.	B-L.	Snead.	Shel.	8.75	Shel.	Ross.	Smith.
Larabee.....L4	2½	4000	160	S-36x5	S-36x10d	Cont.	L4.	4-4½x5½	Zenith.	Bosch.	Bosch.	Bosch.	Exide.	B-L.	B-L.	Snead.	Shel.	10.33	Shel.	Ross.	Smith.
Luedinghaus.....K	2½	2790	145	S-36x4	S-36x7	Wauk.	RU4R.	4-4½x5½	Scheib.	Split.	...	...	...	B & B.	B-L.	Spicer.	Wisc.	8.16	Schul.	Lav.	...
Maccar.....HA	2	...	162	S-36x4	S-36x40	Cont.	K4.	4-4½x5½	Strom.	Eisem.	Bosch.	Bosch.	Presto.	B-L.	B-L.	Spicer.	Shel.	8.16	Shel.	Ross.	Dayton.
Maccar.....H2	3	...	162	S-36x4	S-36x5d	Cont.	L4.	4-4½x5½	Strom.	Eisem.	Bosch.	Bosch.	Presto.	B-L.	B-L.	Spicer.	Shel.	8.50	Shel.	Ross.	Dayton.
Maccar.....M3	4	...	174	S-36x5	S-36x6d	Cont.	L4.	4-4½x5½	Strom.	Eisem.	Bosch.	Bosch.	Presto.	B-L.	B-L.	Spicer.	Shel.	8.75	Shel.	Ross.	Dayton.
Mack.....AB	2	3300	144	S-36x4	S-36x4d	Own.	...	4-4½x5	Zenith.	Split.	L-N.	L-N.	Exide.	Own.	Own.	Spicer.	Shel.	6.99	Own.	Own.	Schwar.
Mack.....AB	2	3750	144	S-36x4	S-36x4d	Own.	...	4-4½x5	Zenith.	Split.	L-N.	L-N.	Exide.	Own.	Own.	Spicer.	Shel.	7.66	Own.	Own.	Schwar.
Mack.....AB	2½	3400	144	S-36x4	S-36x4d	Own.	...	4-4½x5	Zenith.	Split.	L-N.	L-N.	Exide.	Own.	Own.	Spicer.	Shel.	8.66	Own.	Own.	Schwar.
Mack.....AB	2½	3850	144	S-36x4	S-36x4d	Own.	...	4-4½x5	Zenith.	Split.	L-N.	L-N.	Exide.	Own.	Own.	Spicer.	Shel.	9.25	Own.	Own.	Schwar.
Mack.....AC	3½	4950	156	S-36x5	S-40x5d	Own.	...	4-4½x6	Zenith.	Split.	L-N.	L-N.	Exide.	Own.	Own.	Spicer.	Shel.	7.54	Own.	Own.	Schwar.
Mapleleaf.....AA	2	3600	144	S-36x4	S-36x7	Hink.	HA400.	4-4 x5½	Strom.	Eisem.	West.	West.	...	Fuller.	Fuller.	Blood.	Shel.	8.66	Shel.	Ross.	Smith.
Mapleleaf.....BB	3	4050	150	S-36x4	S-36x8	Hink.	HA500.	4-4½x5½	Strom.	Eisem.	...	...	...	Fuller.	Fuller.	Blood.	Shel.	8.75	Shel.	Ross.	Smith.
Mapleleaf.....CC	4	4800	160	S-36x5	S-36x10	Hink.	HA200.	4-4½x5½	Strom.	Eisem.	...	...	...	Fuller.	Fuller.	Blood.	Shel.	10.25	Shel.	Ross.	Smith.
Master.....W	2½	3290	144	S-36x4	S-36x7	Buda.	HU.	4-4½x5½	Own.	...	...	...	...	Fuller.	Fuller.	Spicer.	Shel.	8.50	Shel.	Ross.	Prud.
Master.....	2½	4190	158	S-36x5	S-40x5d	Buda.	YTU.	4-4½x6	Own.	...	...	...	...	B-L.	B-L.	Spicer.	Shel.	10.35	Shel.	Ross.	Smith.
Menominee.....D	2	3245	144	S-36x4	S-36x8	Wisc.	TAU.	4-4 x6	Strom.	Eisem.	Bosch.	Bosch.	West.	Fuller.	Fuller.	Cotta.	Shel.	8.66	Shel.	Ross.	Smith.
Moroland.....EX	2	2800	150	S-36x4	S-36x8	Cont.	K4.	4-4½x5½	Strom.	Split.	West.	West.	Hobbs.	Own.	Own.	Peters.	Shel.	7.00	Shel.	Ross.	Smith.
Moroland.....AX	3	3500	160	S-36x5	S-36x10	Cont.	L4.	4-4½x5½	Strom.	Split.	West.	West.	Hobbs.	Own.	Own.	Peters.	Shel.	6.80	Shel.	Ross.	Smith.
Mutual.....2B&2B	2½	...	152	S-36x4	S-36x8	Wisc.	TAU.	4-4 x6	Strom.	Bosch.	West.	West.	Exide.	Own.	Own.	M & E.	Shel.	8.75	Shel.	Ross.	Smith.
Nash.....F	2	2750	124	S-36x6	S-36x6	Buda.	HU.	4-4½x5½	Strom.	Eisem.	...	...	...	B & B.	Own.	Own.	Shel.	8.50	Own.	Lav.	Clark.
Nash.....3018	2	2150	144	S-36x4	S-36x7	Own.	...	4-4½x5½	Strom.	Eisem.	A-L.	A-L.	Willard.	B & B.	Own.	Clark.	Shel.	9.00	Own.	Lav.	Clark.
Nash.....5018	2½	2250	121	S-36x4	S-36x7	Own.	...	4-4½x5½	Strom.	Eisem.	A-L.	A-L.	Willard.	B & B.	Own.	Clark.	Shel.	10.20	Own.	Lav.	Clark.
National.....HD	2½	...	152	S-36x4	S-36x8	Wauk.	CU.	4-4½x5½	Zenith.	Eisem.	N.E.	N.E.	...	H-S.	B-L.	Spicer.	Shel.	7.75	Shel.	Ross.	Smith.
National.....NB	2½	...	164	S-36x5	S-40x10	Wauk.	DU.	4-4½x6	Zenith.	Eisem.	N.E.	N.E.	...	H-S.	B-L.	Spicer.	Shel.	8.75	Shel.	Ross.	Smith.
Nelson.....G3	2½	...	...	S-36x4	S-36x7	Cont.	K4.	4-4½x5½	Strom.	Bosch.	Bosch.	Bosch.	Willard.	B-L.	B-L.	Own.	Shel.	7.75	Shel.	Ross.	Motor.
Nelson.....G4	2½	...	...	S-36x5	S-36x5d	Cont.	L4.	4-4½x5½	Strom.	Bosch.	Bosch.	Bosch.	Willard.	B-L.	B-L.	Own.	Shel.	8.75	Shel.	Ross.	Motor.
Netco.....DK	2	3100	170	S-36x4	S-36x7	Cont.	K4.	4-4½x5½	Zenith.	Eisem.	West.	West.	Exide.	B-L.	B-L.	Hart.	Shel.	8.75	Shel.	Ross.	Arch.
Netco.....HL	2½	3500	170	S-36x4	S-36x8	Cont.	L4.	4-4½x5½	Zenith.	Eisem.	West.	West.	Exide.	B-L.	B-L.	East.	Shel.	8.75	Shel.	Gemm.	Arch.
Niles.....H	2	3000	140	S-36x4	S-36x7	Buda.	ETU.	4-4½x5½	Strom.	Eisem.	...	...	Presto.	B-L.	B-L.	Peters.	Shel.	8.50	Shel.	Gemm.	Hoopes.
Noble.....D-51	2½	2795	162	S-36x4	S-36x8	Buda.	HTU.	4-4½x5½	Strom.	Eisem.	Bosch.	Bosch.	Vesta.	Fuller.	Fuller.	M & E.	Shel.	8.75	Shel.	Lav.	Bimel.
Noble.....E-71	2½	3495	166	S-36x5	S-36x10	Buda.	YTU.	4-4½x6	Strom.	Eisem.	Bosch.	Bosch.	Vesta.	Fuller.	Fuller.	M & E.	Shel.	8.75	Shel.	Lav.	Bimel.
Ogden.....E	2½	...	153	S-36x5	S-36x7	Cont.	C2.	4-4½x5½	Strom.	Split.	Vesta.	...	...	B-L.	B-L.	M & E.	Shel.	8.75	Shel.	Ross.	Stand.
Old Reliable.....B	2	3500	160	S-36x4	S-36x8	Wisc.	UAU.	4-4½x6	Strom.	Bosch.	Vesta.	...	...	Fuller.	Fuller.	Peters.	Shel.	8.75	Shel.	Ross.	Schwa.
Old Reliable.....C	2	4250	167	S-36x5	S-36x10	Wisc.	VAU.	4-4½x6	Strom.	Bosch.	Vesta.	...	...	Fuller.	Fuller.	Peters.	Shel.	8.75	Shel.	Ross.	Schwa.
Olympic.....	2	3200	164	C-36x4	S-36x8	Buda.	ETU.	4-4½x5½	Zenith.	Eisem.	...	...	...	B-L.	B-L.	Spicer.	Shel.	...	Shel.	Ross.	Smith.
Oneida.....C	2	3200	160	S-36x4	S-36x7	Hink.	400	4-4 x5½	Strom.	West.	West.	West.	Gold Seal	Fuller.	Fuller.	Peters.	Shel.	...	Shel.	Ross.	Stand.
Oneida.....D	2	4050	170	S-36x5	S-36x10	Hink.	200	4-4½x5½	Strom.	West.	West.	West.	Gold Seal	Fuller.	Fuller.	Peters.	Shel.	...	Shel.	Ross.	Smith.
Oshkosh.....A	2	2485	130	P-36x6	P-36x6	H-S.	7000	4-3½x5	Zenith.	N.E.	N.E.	N.E.	Willard.	B-L.	B-L.	Peters.	Shel.	8.20	Own.	Ross.	Bimel.
Oshkosh.....B	2½	3485	146	P-40x8	P-40x8	Herc.	CU3.	4-4 x5½	Strom.	N.E.	N.E.	N.E.	Willard.	B-L.	B-L.	Peters.	Shel.	8.00	Own.	Ross.	Bimel.
Packard.....E	2	3100	144	S-36x4	S-36x7	Own.	...	4-4½x5½	Own.	Bijur.	Bijur.	Bijur.	Willard.	Own.	Own.	Spicer.	Shel.	7.25	Own.	Own.	Prud.
Packard.....EX	2	3500	144	P-36x6	P-40x8	Own.	...	4-4½x5½	Own.	Bijur.	Bijur.	Bijur.	Willard.	Own.	Own.	Spicer.	Shel.	8.00	Own.	Own.	Prud.
Packard.....E	3	4100	156	S-36x5	S-36x5	Own.	...	4-4½x5½	Own.	Bijur.	Bijur.	Bijur.	Willard.	Own.	Own.	Spicer.	Shel.	9.00	Own.	Own.	Prud.
Paige.....54-20	2½	2420	150	S-36x4	S-36x8	Hink.	500	4-4½x5½	Strom.	Bosch.	Remy.	Remy.	Willard.	B-L.	B-L.	Spicer.	Shel.	...	Shel.	Ross.	Dayton.
Paige.....51-18	2½	3145	160	S-36x5	S-36x5d	Hink.	200	4-4½x5½	Strom.	Bosch.	Remy.	Remy.	Willard.	B-L.	B-L.	Spicer.	Shel.	...	Shel.	Ross.	Dayton.
Parker.....G1	2	3200	158	S-36x4	S-36x8	Wisc.	UAU.	4-4½x6	Strom.	Eisem.	West.	West.									

2-2½-3-3½-4-4½ Ton Trucks—(Continued)

MAKE AND MODEL	GENERAL					ENGINE				ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR			
	Tons Capacity	Chassis Price	Standard Wheelbase (Ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make
				Front (Ins.)	Rear (Ins.)												Make	Total Gear Reduction			
Sterling.....	2	\$3085	142	S-36x4	S-36x6	Wauk.	FU.....	4-4 x5½	Zenith.	Eisem.	Bosch*	Bosch*	Gould*	B-L.....	B-L.....	Univ.	Timk.	7.70	Timk.	Ross.	Prud.
Sterling.....	2½	3290	156	S-36x4	S-36x4d	Wauk.	CU.....	4-4½ x5½	Zenith.	Eisem.	Bosch*	Bosch*	Gould*	B-L.....	B-L.....	Univ.	Timk.	7.70	Timk.	Ross.	Prud.
Sterling.....	3	4325	162	S-36x5	S-40x5d	Wauk.	DU.....	4-4½ x5½	Zenith.	Eisem.	Bosch.	Bosch.	Gould.	HS.....	Own.	M. & E.	Timk.	8.75	Timk.	Ross.	Prud.
Stewart.....	7X	2390	156	S-36x4	S-34x8d	Buda.	HTU.....	4-4½ x5½	Zenith.	Eisem.	Remy.	Remy.	Willard.		Fuller.	Hart.	Clark.		Colum.	Ross.	Clark.
Stewart.....	10X	3190	165	S-36x5	S-36x12	Buda.	YTU.....	4-4½ x6	Zenith.	Eisem.	Eisem.				Fuller.	Spicer.	Clark.		Colum.	Ross.	Clark.
Stoughton.....	D	2490	140	S-36x4	S-36x7	Herc.	CU3.....	4-4 x5½	Strom.	Eisem.	West*	*	Willard*	B-L.....	B-L.....	Therm.	Shel.	8.66	Shel.	Ross.	Royer.
Stoughton.....	F	3150	156	S-36x5	S-36x5d	Midw.	402.....	4-4½ x5½	Zenith.	Eisem.	Remy*	*		B-L.....	B-L.....	Therm.	Shel.	8.75	Shel.	Ross.	Royer.
Superior.....	E	2450	144	S-36x4	S-36x6	Cont.	C2.....	4-4½ x5½	Strom.	Eisem.	Remy*	West*	Willard*	Fuller.	Fuller.	Arvac.	Torb.		Torb.	Ross.	Schwa.
Tiffin.....	MW	2700	148	S-36x4	S-36x3½d	Cont.	C4.....	4-4½ x5½	Scheb.	Bosch.	Eisem*	West*	Willard*	Fuller.	Fuller.	Peters.	Shel.	8.75	Shel.	Ross.	Smith.
Tiffin.....	F35	3600	160	S-36x5	S-40x5d	Cont.	LA.....	4-4½ x5½	Strom.	Bosch.	West*	West*	Willard*	Delt.	Cotta.	Peters.	Shel.		Shel.	Ross.	Smith.
Titan.....		2950	156	S-36x4	S-36x8	Buda.	HTU.....	4-4½ x5½	Zenith.	Eisem.	West*	West*	Willard*	B. & B.	Cotta.		Own.	8.50	Wisc.	Lav.	Smith.
Titan.....		3950	156	S-36x5	S-40x10	Buda.	YTU.....	4-4½ x5½	Zenith.	Eisem.	West*	West*	Willard*	B. & B.	Cotta.		Own.		Schul.	Lav.	Smith.
Tower.....	H	3200	146	S-36x4	S-36x8	Cont.	C4.....	4-4½ x5½	Strom.	Eisem.				Fuller.	Fuller.	Spicer.	Timk.		Timk.	Ross.	
Tower.....	G	4100	165	S-36x5	S-36x10	Cont.	E4.....	4-4½ x5½	Strom.	Eisem.				Fuller.	Fuller.	Spicer.	Timk.		Timk.	Ross.	
Transport.....	35	1885	140	S-36x3½	S-36x6	Cont.	N.....	4-3½ x5	Strom.	Eisem.	Remy.	Remy.	Willard.	Fuller.	Fuller.	Hart.	Clark.	7.60	Colum.	Jacox.	Motor.
Transport.....	55	2385	150	S-36x4	S-36x8	Cont.	C2.....	4-4½ x5½	Strom.	Eisem.	Eisem.	Remy.	Willard.	Fuller.	Fuller.	Hart.	Clark.	8.15	Colum.	Jacox.	Motor.
Transport.....	60	2585	150	S-36x4	S-36x8	Buda.	HTU.....	4-4½ x5½	Zenith.	Eisem.	Remy.	Remy.	Willard.	Fuller.	Fuller.	Hart.	Clark.	8.15	Colum.	Jacox.	Motor.
Traylor.....	C	2850	146	S-36x4	S-36x7d	Buda.	ITU.....	4-4 x5½	Strom.	Split.	West.	West.	Willard.	Covert.	Covert.	M. & E.	Shel.	7.80	Shel.	Ross.	Schw.
Traylor.....	D	3360	150	S-36x4	S-36x8d	Buda.	HTU.....	4-4½ x5½	Zenith.	West.	West.	West.	Willard.	Own.	Own.	Hart.	Shel.		Shel.	Ross.	Schw.
Triangle.....	B	2585	150	S-36x4	S-36x8	Wauk.	FU.....	4-4 x5½	Strom.	Eisem.	Split*		Exide*	Fuller.	Fuller.	Blood.	Clark.	9.00	Torb.	Gemm.	North.
Triangle.....	C	2285	147	S-36x4	S-36x7	Wauk.	BUX.....	4-3½ x5½	Strom.	Eisem.	Eisem*	N.E.*	Exide*	Fuller.	Fuller.	Univ.	Clark.	9.00	Torb.	Gemm.	North.
Twin City.....	BW	2750	150	S-36x4	S-36x7	Buda.	ITU.....	4-4 x5½	Strom.	Bosch.	N.E.*	*	Willard*	Fuller.	Fuller.	Arvac.	Clark.	8.00	Schul.	Ross.	Bimel.
Twin City.....	B	3150	140	S-36x5	S-36x6	Wisc.	J.A.....	4-5½ x6	Strom.	W.K.				H-S.	Cotta.	Own.				Ross.	Schw.
Twin City.....	AW	4000	168	S-36x5	S-40x5d	Own.		4-4½ x6	Scheb.	Bosch.	N.E.*	N.E.*	Willard*	B. & B.	Fuller.	Spicer.	Timk.	10.33	Timk.	Ross.	Smith.
Ultimate.....	AJL	3250	156	S-36x3½	S-36x3½	Buda.	HTU.....	4-4½ x5½	Strom.	Eisem.	Bosch*	Bosch*	Willard*	B-L.....	B-L.....	Spicer.	Sheld.	6.50	Sheld.	Ross.	Jones.
Ultimate.....	B	3750	154	S-36x4	S-36x8	Buda.	HTU.....	4-4½ x5½	Strom.	Eisem.	Bosch*	Bosch*	Willard*	B-L.....	B-L.....	Spicer.	Sheld.	7.75	Sheld.	Ross.	Jones.
United Motors.....	50	1795	156	C-34x4	S-34x8	Herc.	O.....	4-4 x5	Zenith.	Bosch.	Bosch*	Bosch*	West*	B-L.....	B-L.....	Spicer.	Wisc.	7.00	Schul.	Lav.	Bimel.
United States.....	R	2675	156	S-36x4	S-36x8	Hink.	HAA400.....	4-4 x5½	Strom.	Eisem.	Bosch*	Bosch*	West*	B-L.....	B-L.....	Blood.	Sheld.	8.70	Sheld.	Lav.	Schw.
United States.....	S	3425	168	S-36x5	S-36x5d	Hink.	HA200.....	4-4½ x5½	Strom.	Eisem.	Bosch*	Bosch*	West*	B-L.....	B-L.....	Blood.	Sheld.	10.25	Sheld.	Lav.	Schw.
Veteran.....	D	4400	156	S-36x4	S-36x7	Buda.	HTU.....	4-4½ x5½	Zenith.	Eisem.				B. & B.	Cotta.	Spicer.	Sheld.	7.75	Sheld.	Ross.	Smith.
Veteran.....	H	5600	156	S-36x5	S-36x10	Buda.	YTU.....	4-4½ x6	Zenith.	Eisem.				B. & B.	Cotta.	Spicer.	Sheld.	8.75	Sheld.	Ross.	Smith.
Walker-Johnson.....	B	3000	150	S-36x4	S-36x8	Buda.	HU.....	4-4½ x5½	Zenith.	Eisem.	Eisem*	*	*	Fuller.	Fuller.	Spicer.	Timk.	8.50	Timk.	Ross.	Jones.
Walter.....	M	3500	144	S-36x4	S-36x8	Own.		4-4 x5½	Strom.	Apollo.	West.	West.	Exide.	B-L.....	B-L.....	Own.	Own.	7.25	Cont.	Gemm.	Jones.
Western.....	L	3200	152	S-36x4	S-36x7	Buda.	ETU.....	4-4½ x5½	Strom.	Bosch.	Bosch*	Bosch*	Vesta*	Fuller.	Fuller.	Spicer.	Wisc.	7.75	Timk.	Ross.	Prud.
Western.....	W	3200	152	S-36x4	S-36x7	Cont.	C4.....	4-4½ x5½	Strom.	Bosch.	Vesta*	*	*	Fuller.	Fuller.	Spicer.	Wisc.	8.50	Schul.	Lav.	Prud.
Western.....	W	4000	176	S-36x5	S-40x10	Buda.	YTU.....	4-4½ x6	Strom.	Bosch.	Bosch*	Bosch*	Vesta*	Fuller.	Fuller.	Spicer.	Timk.	10.33	Timk.	Ross.	Prud.
White.....	20	3200	168	S-36x4	S-36x7d	Own.		4-3½ x5½	Zenith.		N.E.*	N.E.*	Willard*	Own.	Own.	Own.	Own.	9.25	Own.	Own.	
White.....	40	4200	174	S-36x5	S-40x5d	Own.		4-4½ x5½	Zenith.		Neville			Own.	Own.	Own.	Own.	11.60	Own.	Own.	
Wichita.....	M	2800	144	S-36x3½	S-36x6	Wauk.	BX.....	4-4½ x5½	Strom.	Eisem.	N.E.*	N.E.*	Vesta*	Own.	B-L.....	Own.	Shel.	8.60	Shel.	Ross.	Bimel.
Wichita.....	MX	3600	160	S-36x4	S-36x8	Wauk.	CU.....	4-4½ x5½	Strom.	Eisem.	N.E.*	N.E.*	Vesta*	Hart.	B-L.....	Own.	Shel.	8.75	Shel.	Ross.	Dayton.
Wichita.....	O	4000	165	S-36x5	S-36x5d	Wauk.	DU.....	4-4½ x6	Strom.	Eisem.	N.E.*	N.E.*	Vesta*	Hart.	B-L.....	Own.	Shel.	11.75	Shel.	Ross.	Smith.
Wilcox.....	CC	3000	150	S-36x6	S-40x8	Own.		4-4½ x5	Strom.	Bosch.	West*	West*	Bimel.	B. & B.	Own.	Blood.	Walker.	8.50	Schul.	Own.	Clark.
Wilcox.....	EE	3685	162	S-36x5	S-36x10	Buda.	YTU.....	4-4½ x6	Strom.	Bosch.	West*	West*	Bimel.	M. & E.	Own.	Spicer.	Walker.	10.50	Shel.	Own.	Clark.
Winter Hirsch.....	K	3250	152	S-36x4	S-36x8	Cont.	K4.....	4-4½ x5½	Strom.	Bosch.	Bosch*	Bosch*	Vesta*	B-L.....	B-L.....	Spicer.	Timk.	8.50	Timk.	Ross.	Bimel.
Winter Hirsch.....	L	4200	178	S-36x5	S-40x10	Cont.	LA.....	4-4½ x5½	Strom.	Bosch.	Bosch*	Bosch*	Vesta*	B-L.....	B-L.....	Spicer.	Timk.	10.33	Timk.	Ross.	Bimel.
Winther.....	51	3175	150	S-36x4	S-36x4d	Wisc.	TAU.....	4-4 x6	Master.	Eisem.				B. & B.	B-L.....	Blood.	Clark.	8.80	Torb.	Ross.	Own.
Winther.....	452	3775	150	S-36x6	S-36x5d	Wisc.	TAU.....	4-4 x6	Master.	Eisem.	West*	West*	Willard*	Fuller.	Fuller.	Peters.	Clark.		Own.	Lav.	Own.
Winther.....	70	3650	150	S-36x5	S-36x5d	Wisc.	UAU.....	4-4½ x6	Master.	Eisem.	West*	West*	Willard*	B. & B.	B-L.....	Blood.	Clark.		Timk.	Ross.	Clark.
Wisconsin.....	D	2700	146	S-36x6	S-38x7	Wauk.	TU.....	4-4 x5½	Strom.	Eisem.	Bosch*	Bosch*	Exide*	B-L.....	B-L.....	Spicer.	Timk.	8.75	Cont.	Lav.	Bimel.
Wisconsin.....	E	3000	146	S-36x5	S-36x10	Wauk.	CU.....	4-4½ x5½	Strom.	Eisem.	Bosch*	Bosch*	Exide*	B-L.....	B-L.....	Spicer.	Timk.	8.75	Cont.	Lav.	Bimel.
Witt Will.....	P	2900	144	S-36x4	S-36x8d	Cont.	K4.....	4-4½ x5½	Zenith.	Eisem.	Eisem*	*	Lyon*	B-L.....	B-L.....	Spicer.	Timk.	7.75	Timk.	Ross.	Arch.

ABBREVIATIONS:

†—Taken from 1922 specifications
 ‡—Canadian Manufactured

TIRES:

S.—Solid
 P.—Pneumatic
 C.—Cushion
 S.*—Pneumatics Optional at extra cost

ENGINE:

Midw.—Midwest
 Cont.—Continental
 H.S.—Herschell-Spillman
 Wisc.—Wisconsin
 Herc.—Hercules
 Hink.—Hinkley
 Locom.—Lycoming
 Weld.—Weidely
 Wauk.—Waukesha
 FL. PR.—Pressure to all bearings including wrist pins
 SP. PR.—Splash with pressure to main bearings
 Press.—Pressure to main bearings only

RAY.—Rayfield

Strom.—Stromberg
 Scheb.—Schebler

Tillot.—Tillotson

Stew.—Stewart
 McC.—McCanna
 Mon.—Monarch

ELECTRICAL SYSTEM:

Eisem.—Eisemann
 Conn.—Connecticut
 Split.—Splitdorf
 A.K.—Atwater-Kent
 A.L.—Auto-Lite
 West.—Westinghouse
 N.E.—North East
 Mag.—Magneto
 Bat.—Battery
 L.N.—Leece-Neville
 G. & D.—Gray & Davis
 Prest.—Prest-O-Lite
 Phila.—Philadelphia

TRANSMISSION:

B.-L.—Brown-Lipe
 B. & B.—Borg & Beck
 Dett.—Detroit
 G.-L.—Grant-Lee
 M. & E.—Merchant & Evans
 Mech.—Mechanics
 Hoos.—Hoosier
 Camp.—Campbell
 Durst.—Durst
 Univ.—Universal
 Therm.—Thermoid-Hardy
 Hart.—Hartford
 Opt.*—Optional at extra cost
 Timk.—Timken
 I. M.—Iron Mountain
 Torb.—Torbenon
 Colum.—Columbia
 Sheld.—Sheldon
 Wisc.—Wisconsin
 Salls.—Salisbury
 Dunk.—Dunkirk
 Shul.—Shuler

D. R.—Double Reduction

I. G.—Internal Gear
 W.—Worm
 S. B.—Straight Bevel
 S. P.—Spiral Bevel
 F.—Floating
 ½ F.—Semi-Floating
 ¾ F.—Three Quarter Floating
 Od.—Dead

RUNNING GEAR:

Lav.—Lavine
 Gemm.—Gemma
 St. M.—St. Marys
 Arch.—Archibald
 Indes.—Indestructible
 Prud.—Prudden
 Schw.—Schwartz
 Stand.—Standard
 E. & O.—Eberly & Oris
 Dett.—Detroit
 Hydr.—Hydraulic
 Fire.—Firestone

5 Ton and Larger Trucks

MAKE AND MODEL	GENERAL					ENGINE				ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR				
	Tons Capacity	Chassis Price	Standard Wheelbase (Ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make	
				Front (Ins.)	Rear (Ins.)												Make	Total Gear Reduction				
Acme	125	5	180	S-36x6	S-40x12d	Cont.	B2	4-4½x6	Ray	Eisem.	Deleo*	.....	Willard*	B. & B.	Cotta . . .	Blood . . .	Timk . . .	.....	Timk . . .	Ross . . .	Smith . . .	
American . . .	50	5	\$1500	158	S-36x5	Wisc. . .	VAU . . .	4-4½x6	Strom . . .	Apollo . .	G. & D.	.....	Hart . . .	Detl. . . .	Cotta . . .	Aeme . . .	Thom. . .	10.23	Savage . .	Lav. . . .	Indest. . .	
Atterbury . .	8E	5-6	4975	167½	S-36x5	S-40x6	Cont. . .	B2	4-4½x6	Zenith . .	Eisem.	Deleo . .	.....	Willard . .	B-L . . .	B-L . . .	Spicer . .	Timk . . .	11.66	Timk . . .	Gemm . .	Dayton . .
Autocar . . .	26-Y	5	4200	120	S-34x6	S-36x12	Own. . .	B2	4-4½x5½	Strom . .	Bosch . .	L-N*	L-N*	Exide . .	Own. . .	Own. . .	Spicer . .	Own. . .	8.72	Own. . .	Ross . . .	H.B.D.
Autocar . . .	26-B	5	4350	156	S-34x6	S-36x12	Own. . .	B2	4-4½x5½	Strom . .	Bosch . .	L-N*	L-N*	Exide . .	Own. . .	Own. . .	Spicer . .	Own. . .	8.72	Own. . .	Ross . . .	H.B.D.
Available . .	H5	5	5375	190	S-36x6	S-40x12d	Here . .	T3	4-5x6	Strom . .	Bosch . .	Bosch*	Bosch*	Vesta*	B-L . . .	B-L . . .	Spicer . .	Timk . . .	11.66	Timk . . .	Ross . . .	Smith . . .

5 Ton and Larger Trucks—Continued

MAKE AND MODEL	GENERAL				ENGINE				ELECTRICAL SYSTEM				TRANSMISSION				RUNNING GEAR					
	Tons Capacity	Chassis Price	Standard Wheelbase (Ins.)	TIRE SIZE AND TYPE		Make	Model	No. of Cylinders Bore and Stroke	Carburetor Make	Ignition System Make	Generator Make	Starter Make	Battery Make	Clutch Make	Gearset Make	Universal Make	REAR AXLE		Front Axle Make	Steering Gear Make	Wheels Make	
				Front (Ins.)	Rear (Ins.)												Make	Total Gear Reduction				
Brockway.....T	5	.....	174	S-36x6	S-40x7d	Cont.	B5.....	4-4 1/2 x 6	Strom.	Eisem.	Dyneto*	Dyneto*	Prest.	B-L.....	B-L.....	Spicer.	Timk.	10.25	Timk.	Gemm.	Smith.
Chicago.....D5	5	.....	.....	S-36x6	S-40x12	Here.	MU3.....	4-4 1/2 x 5 1/2	Zenith.	Bosch.	Bosch*	Bosch*	Vesta.	B-L.....	B-L.....	Peters.	Huck.	.....	Timk.	Gemm.	St.M.
Clydesdale.....6	5	\$3650	163	S-36x5	S-36x5d	Cont.	L4.....	4-4 1/2 x 5 1/2	Zenith.	Bosch.	Bosch*	Bosch*	Willard.	B-L.....	B-L.....	Spicer.	Timk.	9.25	Timk.	Ross.	.....
Clydesdale.....4	6	4300	177	S-36x6	S-40x6d	Cont.	B5.....	4-4 1/2 x 6	Zenith.	Bosch.	Bosch*	Bosch*	Willard.	B-L.....	B-L.....	Spicer.	Timk.	10.33	Timk.	Ross.	.....
Clydesdale.....2	8 1/2	4750	176	S-36x7	S-40x7d	Cont.	B5.....	4-4 1/2 x 6	Zenith.	Bosch.	Bosch*	Bosch*	Willard.	B-L.....	B-L.....	Spicer.	Timk.	11.66	Timk.	Ross.	.....
Day-Elder.....E	5	4250	162	S-36x5	S-40x6d	Buda.	YU.....	4-4 1/2 x 6	Zenith.	Eisem.	Eisem*	.....	Willard.	B-L.....	B-L.....	Hart.	Sheld.	10.25	Sheld.	Gemm.	Jones.
Denby.....210	5	4295	170	S-36x6	S-40x6	Cont.	E7.....	4-4 1/2 x 5 1/2	Strom.	Eisem.	.....	.....	.....	B-L.....	B-L.....	Peters.	Clark.	12.55	Stand.	Ross.	Clark.
Diamond T.....EL	5	4325	180	S-36x6	S-40x6d	Hink.	HA200	4-4 1/2 x 5 1/2	Strom.	Bosch.	Bosch*	.....	Exide*	Covet.	Covet.	Spicer.	Timk.	13.66	Timk.	Gemm.	Smith.
Diamond T.....S	5	4500	170	S-36x6	S-40x6d	Buda.	BTU.....	4-4 1/2 x 6	Strom.	Bosch.	Bosch*	Bijur.	Exide*	B-L.....	B-L.....	Spicer.	Timk.	11.66	Timk.	Gemm.	Smith.	
Doane.....6	6	6000	178	S-36x5	S-40x12	Wauk.	E.....	4-5 x 6 1/2	Strom.	Bosch.	.....	.....	.....	B-L.....	B-L.....	Own.	Own.	10.60	Own.	Lav.	West.
Fageol.....6	5	5700	172	S-36x6	S-40x6d	Wauk.	DU.....	4-4 1/2 x 6 1/2	Zenith.	Split.	.....	.....	.....	B-L.....	B-L.....	Spicer.	Timk.	.....	Timk.	Ross.	.....
Federal.....X-2	5	.....	163	S-36x6	S-40x6	Cont.	B5.....	4-4 1/2 x 6	Zenith.	Eisem.	Remy.	.....	.....	B & B.	Warner.	Spicer.	Timk.	10.25	Timk.	Gemm.	Smith.
G.M.C. K-101-A	5	3950	163	S-36x5	S-40x6d	Own.	.....	4-4 1/2 x 6	Marvel.	Eisem.	Remy.	Remy.	Willard.	Own.	Own.	Own.	Timk.	10.00	Timk.	Jacox.	Own.
G.M.C. K-101-T	5	4050	138	S-36x5	S-40x14	Own.	.....	4-4 1/2 x 6	Marvel.	Eisem.	Remy.	Remy.	Willard.	Own.	Own.	Own.	Timk.	11.67	Timk.	Jacox.	Own.
Garford.....68D	5	4500	162	S-36x6	S-40x6d	Buda.	BTU.....	4-5 x 6 1/2	Strom.	Split.	West*	West*	Exide*	Own.	Own.	Spicer.	Timk.	8.80	Timk.	Ross.	Smith.	
Garford.....150A	7 1/2	5250	162	S-36x6	S-40x7d	Buda.	BTU.....	4-5 x 6 1/2	Strom.	Split.	West*	West*	Exide*	Own.	Own.	Spicer.	Timk.	11.44	Timk.	Ross.	.....
Gary.....M	5	4800	182	S-36x6	S-40x6d	Buda.	BTU.....	4-5 1/2 x 6 1/2	Zenith.	Eisem.	Vesta.	West.	Vesta.	B-L.....	B-L.....	Opt.	Timk.	11.23	Timk.	Ross.	.....
Gotfredson.....100	5	5500	166 1/2	S-36x6	S-40x14	Buda.	BTU.....	4-5 x 6 1/2	Zenith.	Bosch.	A.K.	.....	Exide.	B-L.....	B-L.....	Spicer.	Timk.	10.33	Timk.	Gemm.	Dayton.
Gramm Pioneer50	5-6	4450	168	S-36x6	S-40x6d	Cont.	B2.....	4-4 1/2 x 6	Strom.	Eisem.	N-E.	N-E*	Exide.	Own.	Own.	Own.	Sheld.	10.25	Eaton.	Ross.	Smith.	
Harvey.....WFT	6	3050	125	S-36x5	S-36x10	Buda.	ETU.....	4-4 1/2 x 5 1/2	Strom.	Split.	West*	West*	Vesta*	Fuller.	B-L.....	Spicer.	Sheld.	9.50	Sheld.	Ross.	Smith.	
Harvey.....WHT	10	4050	125	S-36x6	S-36x12	Buda.	YTU.....	4-5 1/2 x 6	Strom.	Split.	West*	West*	Vesta*	Fuller.	B-L.....	Spicer.	Sheld.	10.20	Sheld.	Ross.	Smith.	
Hendrickson.....K	6	4000	.....	S-36x6	S-40x12d	Wauk.	EU.....	4-5 x 6	Strom.	Split.	.....	.....	.....	Fuller.	Fuller.	M & E.	Timk.	11.66	Timk.	Ross.	Inters.
Indiana.....5	5	.....	170	S-36x5	S-40x6d	Wauk.	EU4.....	4-5 x 6 1/2	Zenith.	Eisem.	.....	.....	.....	B & B.	B-L.....	Spicer.	Sheld.	8.75	Sheld.	Wohl.	Opt.
International.101	5	3600	160	S-36x5	S-40x12	Own.	.....	4-4 1/2 x 5	Ensign.	Split.	.....	.....	.....	Own.	Own.	Own.	Own.	10.98	Own.	Own.	Own.
K-Z.....5	5	4400	162	S-36x6	S-40x12	Cont.	B2.....	4-4 1/2 x 6	Strom.	Bosch.	.....	.....	.....	B-L.....	B-L.....	Snead.	Timk.	11.66	Timk.	Lav.	Smith.
Kalamazoo.....OK	5	4350	160	S-36x6	S-40x14	Wisc.	VAU.....	4-4 1/2 x 6	Strom.	Bosch.	Dyneto*	Dyneto*	U.S.L.*	Fuller.	Fuller.	Blood.	Sheld.	13.00	Sheld.	Ross.	Smith.	
Kelly Sp'f'd. K-50	5	4400	158	S-36x6	S-40x6d	Own.	.....	4-4 1/2 x 6 1/2	Zenith.	Eisem.	Delco*	Delco*	Willard*	B & B.	Covet.	Own.	Own.	12.24	Own.	Gemm.	Smith.
Kelly Sp'f'd. K-61	5-7	4800	156	S-36x6	S-36x7d	Own.	.....	4-4 1/2 x 6 1/2	Zenith.	Eisem.	Delco*	Delco*	Willard*	B & B.	Covet.	Peters.	Clark.	11.66	Own.	Gemm.	Clark.
Kimball.....AF	5	5200	164	S-36x6	S-40x7d	Wisc.	RAU.....	4-4 1/2 x 6	Zenith.	Split.	Split*	.....	.....	B-L.....	B-L.....	Peters.	Timk.	.....	Timk.	Ross.	Smith.
Krebs.....140	5	.....	176	S-36x6	S-40x6d	Cont.	B2.....	4-4 1/2 x 6	Zenith.	Bosch.	Bosch*	Bosch*	Willard*	B-L.....	B-L.....	Spicer.	Timk.	11.66	Timk.	Ross.	Smith.
Maccar.....G	5	.....	186	S-36x5	S-36x6	Cont.	B2.....	4-4 1/2 x 6	Strom.	Eisem.	Bosch*	Bosch*	Presto*	B-L.....	B-L.....	Spicer.	Timk.	10.25	Timk.	Ross.	Smith.
Mack.....AC	5	5500	156	S-36x6	S-40x16	Own.	.....	4-5 x 6	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	8.31	Own.	Own.	Schw.
Mack.....AB	5	3400	120	S-36x4	S-36x4	Own.	.....	4-4 1/2 x 5	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	10.53	Own.	Own.	Schw.
Mack.....AC	6 1/2	5750	156	S-36x6	S-40x12d	Own.	.....	4-5 x 6	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	8.95	Own.	Own.	Schw.
Mack.....AC	7	4950	120 1/2	S-36x5	S-40x5d	Own.	.....	4-5 x 6	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	9.69	Own.	Own.	Schw.
Mack.....AC	7 1/2	6000	156	S-36x7	S-40x7d	Own.	.....	4-5 x 6	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	9.69	Own.	Own.	Schw.
Mack.....AC	10*	5500	120 1/2	S-36x6	S-40x6d	Own.	.....	4-5 x 6	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	10.50	Own.	Own.	Schw.
Mack.....AC	13*	5750	120 1/2	S-36x6	S-40x12d	Own.	.....	4-5 x 6	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	11.58	Own.	Own.	Schw.
Mack.....AC	15*	6000	120 1/2	S-36x8	S-40x7d	Own.	.....	4-5 x 6	Zenith.	Split.	L-N*	L-N*	Exide*	Own.	Own.	Spicer.	Own.	12.92	Own.	Own.	Schw.
MacDonald.....A	7 1/2	5750	180	S-40x7	S-40x14	Buda.	.....	4-4 1/2 x 6	Strom.	.....	.....	.....	.....	B-L.....	B-L.....	Own.	Own.	17.50	Own.	Own.	Own.
Mapleleaf.....DD	5	5625	160	S-36x6	S-36x12	Hink.	1600	4-4 1/2 x 5 1/2	Strom.	Eisem.	.....	.....	.....	Fuller.	Fuller.	Blood.	Sheld.	13.00	Sheld.	Ross.	Smith.
Master.....B	5	5290	170	S-36x6	S-40x6d	Buda.	ATU.....	4-4 1/2 x 6 1/2	Own.	.....	.....	.....	.....	B-L.....	B-L.....	Spicer.	Timk.	11.66	Timk.	Ross.	Smith.
Menominee.....J	5	.....	160	S-42x9	S-42x10a	Wisc.	RAU.....	4-4 1/2 x 6	Strom.	Eisem.	Bosch.	Bosch.	Willard.	B & B.	Cotta.	Spicer.	Timk.	.....	Timk.	Ross.	Smith.
Moreland.....RX	5	4600	168	S-36x6	S-40x12	Cont.	B5.....	4-4 1/2 x 6	Strom.	Split.	West*	.....	.....	Own.	Own.	Peters.	Timk.	8.75	Timk.	Ross.	Smith.
National.....1923	5	.....	164	S-36x6	S-40x12	Wauk.	EU.....	4-5 x 6 1/2	Zenith.	Eisem.	N-E*	N-E*	Opt*	H-S	B-L.....	Spicer.	Timk.	10.25	Timk.	Ross.	Smith.
Nelson Le M'n.G5	5	.....	.....	S-36x6	S-40x6d	Cont.	B2.....	4-4 1/2 x 6	Strom.	Bosch.	Bosch*	.....	.....	B-L.....	B-L.....	.....	Timk.	11.66	Timk.	Ross.	Motor.
Old Reliable.....D	5	5000	165	S-36x6	S-40x12d	Wisc.	RAU.....	4-4 1/2 x 6	Strom.	Apollo.	Vesta*	.....	West*	Own.	B-L.....	.....	Sheld.	10.25	Sheld.	Ross.	Schw.
Old Reliable.....K	7 1/2	6000	136	S-36x6	S-40x14d	Wauk.	.....	4-4 1/2 x 6 1/2	Strom.	Bosch.	Vesta*	.....	West*	Own.	Own.	Peters.	Own.	10.07	Cont.	Ross.	Schw.
Packard.....E	5-7	4500	156	S-36x6	S-40x6d	Own.	.....	4-5 1/2 x 6	Own.	Bijur.	Bijur.	Bijur.	Willard*	Own.	Own.	Spicer.	Own.	10.66	Own.	Own.	Clark.
Parker.....M-20	5	4850	160	S-36x6	S-40x6d	Wisc.	RBU.....	4-5 x 6	Own.	Eisem.	West*	West*	Willard.	B-L.....	Warner.	Blood.	Timk.	10.33	Shuler.	Ross.	Smith.	
Pierce Arrow.R10	5	4850	168	S-36x5	S-40x6d	Own.	.....	4-4 1/2 x 6 1/2	Strom.	Delco.	Delco.	Delco.	Willard.	Own.	Own.	Spicer.	Own.	10.00	Own.	Own.	Dayton.
Rainier.....R-27	6	.....	170	S-36x6	S-40x6	Cont.	B2.....	4-4 1/2 x 6	Zenith.	Eisem.	.....	.....	.....	B-L.....	B-L.....	Spicer.	Timk.	13.66	Timk.	Ross.	Smith.
Rowe.....FW	5	4850	170	S-36x7	S-40x6d	Wisc.	VAU.....	4-4 1/2 x 6	Zenith.	Bosch.	Willard*	B-L.....	B-L.....	Spicer.	Sheld.	10.25	Sheld.	Ross.	Smith.
Schacht.....5	5	4400	168	S-36x5	S-40x6	Wisc.	VAU.....	4-4 1/2 x 6	Zenith.	Bosch.	.....	.....	.....	B & B.	Own.	Spicer.	Own.	14.00	Own.	Own.	St.M.
Schacht.....7	7	5050	168	S-36x6	S-40x7d	Wisc.	VAU.....	4-4 1/2 x 6	Zenith.	Bosch.	.....	.....	.....	B & B.	Own.	Spicer.	Own.	14.00	Own.	Own.	St.M.
Selden.....A	5	5600	164	S-36x5	S-40x12	Cont.	B2.....	4-4 1/2 x 6	Strom.	Eisem.	N-E.	N-E	Willard.	B-L.....	B-L.....	Spicer.	Timk.	.....	Timk.	Gemm.	Stand.
Service.....102	6	.....	.....	S-36x6	S-40x6d	Buda.	YTU.....	4-4 1/2 x 6	Strom.	Eisem.	West*	West*	Willard.	B-L.....	B-L.....	Spicer.	Timk.	10.25	Timk.	Ross.	Inters.
Signal.....M	5	.....	168	S-36x5	S-40x10	Cont.	L4.....	4-4 1/2 x 6 1/2	Strom.	Eisem.	Delco*	Delco*	Willard*	B-L.....	B-L.....	Spicer.	Timk.	12.0			

Buyers' Guide to 1923 Tractors

One and Two Plow

Name and Model	Draw- Bar h.p.	Belt h.p.	Price	Traction	Cylinders	Fuel
Allis-Chalmers	6	12	\$ 245	2 W.	4 Ver.	G
Avery	8	16		2 W.	2 Hor.	G-K
Cletrac, F	9	16		2 T.	4 Ver.	G-K
Fageol	9	12		2 W.	4 Ver.	G
Fordson		18	395	2 W.	4 Ver.	G-K
Frick	12	20		2 W.	4 Ver.	G-K
Hart-Parr, 20		20		2 W.	2 Hor.	G-K
Heider, D	9	16	628	2 W.	4 Ver.	G-K
International	8	16		2 W.	4 Ver.	G-K
La Crosse	6	12		2 W.	2 Hor.	G-K
Leader, B	12	18		2 W.	2 Opp.	G-K
Moline Universal	9	18	1650	2 W.	4 Ver.	G
Moline Universal	D9	18	650	2 W.	4 Ver.	G
Russell, Jr.	12	24		2 W.	4 Ver.	G-K
Toro	6	10	675	2 W.	4 Ver.	G
Townsend	10	20	800	2 W.	2 Hor.	G-K
Traylor	6	12	500	2 W.	4 Ver.	G
Uncle Sam, C-20	12	20	1235	2 W.	4 Ver.	G-K
Wallis, K	15	25		2 W.	4 Ver.	G-K

Three Plow

Allis-Chalmers	15	25	1185	2 W.	4 Ver.	G
Allwork, C	14	28	1293	2 W.	4 Ver.	G-K
Allwork, G	14	28	1595	2 W.	4 Ver.	G-K
Aultman - Taylor	15	30		2 W.	2 Hor.	G-K
Avery	12	25		2 W.	2 Hor.	G-K
Avery				2 W.	4 Hor.	G-K
Avery	14	28		2 W.	4 Hor.	G-K
Avery				2 W.	4 Ver.	G-K
Bates All Steel	15	25		2 T.	4 Ver.	G-K
Bates Steel Mule H15	25			2 T.	4 Ver.	G-K
Bates Steel Mule F18	25			2 T.	4 Ver.	G-K
Bryan	15	30	2500	2 W.	Steam	
Case	12	20	1050	2 W.	4 Ver.	G-K
Case	15	27	1320	2 W.	4 Ver.	G-K
Eagle	12	22		2 W.	2 Hor.	G-K
E-B, AA	12	20		2 W.	4 Ver.	G-K
E-B, G	12	20		2 W.	4 Ver.	G-K
Frick	15	28		2 W.	4 Ver.	G-K
Hart-Parr, 30		30		2 W.	2 Hor.	G-K
Hart-Parr, Road		30		2 W.	2 Hor.	G-K
Heider, C	12	20	725	2 W.	4 Ver.	G-K
Huber, Light 4	12	25	985	2 W.	4 Ver.	G-K
Huber, Super 4	15	30		2 W.	4 Ver.	G-K
International	15	30		2 W.	4 Ver.	G-K
La Crosse, H	12	24		2 W.	2 Opp.	G-K
Leader, N	16	32		2 W.	4 Ver.	G-K
Leader, GU	16	32		2 T.	4 Ver.	G-K
Lauson	12	25		2 W.	4 Ver.	G
Lincoln, A	15	30	1600	2 W.	4 Ver.	G-K
Minneapolis	12	25		2 W.	4 Ver.	G-K

Minneapolis	17	30		2 W.	4 Ver.	G-K
Moline Universal	9	18		2 W.	4 Ver.	G
Moline Universal	D9	18		2 W.	4 Ver.	G
OilPull	12	20		2 W.	2 Hor.	G-K
Russell, Jr.	12	24		2 W.	4 Ver.	G-K
Russell, Little						
Boss	15	30		2 W.	4 Ver.	G-K
Stinson	18	36	\$1635	2 W.	4 Ver.	G-K
Titan	10	20		2 W.	2 Hor.	G-K
Townsend	10	20	800	2 W.	2 Hor.	G-K
Townsend	15	30	1350	2 W.	2 Hor.	G-K
Twin City	12	20		2 W.	4 Ver.	G-K
Uncle Sam, C-20	12	20	1235	2 W.	4 Ver.	G-K
Uncle Sam, B-19	20	30	1985	2 W.	4 Ver.	G-K
Uncle Sam, D-21	20	30	1985	2 W.	4 Ver.	G-K
Wallis, K	15	25		2 W.	4 Ver.	G-K
Waterloo Boy, N	12	25	675	2 W.	2 Hor.	G-K
Wetmore	12	25	1185	2 W.	4 Ver.	G-K
Wisconsin	16	30	1750	2 T.	4 Ver.	G-K
Yuba Ball Tread	15	25	2750	2 W.	4 Ver.	G-K

Four Plow

Allis-Chalmers	20	35	\$1885	2 W.	4 Ver.	G-K
Allwork, D	20	38		2 W.	4 Ver.	G-K

Name and Model	Draw- Bar h.p.	Belt h.p.	Price	Traction	Cylinders	Fuel
Aultman - Taylor	15	30		2 W.	4 Ver.	G-K
Aultman - Taylor	22	45		2 W.	4 Hor.	G-K
Avery	12	25		2 W.	2 Hor.	G-K
Avery				2 W.	4 Hor.	G-K
Avery	14	28		2 W.	4 Hor.	G-K
Avery	18	36		2 W.	4 Hor.	G-K
Avery	20	35		2 W.	4 Hor.	G-K
Bates Steel Mule	25	35		2 T.	4 Ver.	G-K
Bear, B	25	35		2 T.	4 Ver.	G-K
Best, 30	18	30		2 T.	4 Ver.	G-K
Case	15	27		2 W.	4 Ver.	G-K
Case	22	40		2 W.	4 Ver.	G-K
Caterpillar, T11	25			2 T.	4 Ver.	G
Eagle	16	30		2 W.	2 Hor.	G-K
E-B	16	32		Drum	4 Ver.	G-K
Gray	18	36		2 W.	4 Ver.	G
International	15	30		2 W.	4 Hor.	G-K
Leader, N	16	32		2 T.	4 Ver.	G-K
Leader, GU	16	32		2 W.	4 Ver.	G-K
Lauson	15	30		2 W.	4 Ver.	G-K
Little Giant, B	16	22		2 W.	4 Ver.	G-K
Minneapolis	17	30		2 W.	4 Ver.	G-K
Minneapolis	22	44		2 W.	4 Ver.	G-K
Monarch	20	30		2 T.	4 Ver.	G-K
Nichols-Shepard	20	42		2 W.	2 Hor.	G-K
OilPull	16	30		2 W.	2 Hor.	G-K
Pioneer	18	33		2 W.	2 Hor.	G-K
Russell, Little						
Boss	15	30		2 W.	4 Ver.	G-K
Russell, Big Boss	20	40		2 W.	4 Ver.	G-K
Stinson	18	36	1635	2 W.	4 Ver.	G-K
Topp-Stewart	30	45	3500	4 W.	4 Ver.	G
Townsend	15	30	1350	2 W.	2 Hor.	G-K
Townsend	25	50	2500	2 W.	2 Hor.	G-K
Uncle Sam, B 19	20	30	1985	2 W.	4 Ver.	G-K
Uncle Sam, D 21	20	30	1985	2 W.	4 Ver.	G-K
Wisconsin	16	30	1750	2 W.	4 Ver.	G-K
Wisconsin	22	40	2550	2 W.	4 Ver.	G-K

Five and Six Plows

Aultman - Taylor	22	45		2 W.	4 Hor.	G-K
Avery	25	50		2 W.	4 Hor.	G-K
Caterpillar, T16	40			2 T.	4 Ver.	G
Little Giant, A	26	35		2 W.	4 Ver.	G-K
Minneapolis	22	44		2 W.	4 Ver.	G-K
Nichols-Shepard	25	50	\$3000	2 W.	2 Hor.	G-K
OilPull	20	40		2 W.	2 Hor.	G-K
Russell, Big Boss	20	40		2 W.	4 Ver.	G-K
Townsend	25	50	2500	2 W.	4 Ver.	G-K
Yuba Ball Tread	25	40	4250	2 T.	2 Hor.	G-K

Eight and More Plows

Aultman - Taylor	30	60		2 W.	4 Hor.	G-K
Avery	45	65		2 W.	4 Hor.	G-K
Best, 60	35	55		2 T.	4 Ver.	G-K
Case	40	72		2 W.	4 Ver.	G-K
Lombard		100		2 T.	4 Ver.	
Minneapolis	35	70		2 W.	4 Ver.	G-K
Nichols-Shepard	35	70	\$3650	2 W.	2 Hor.	G-K
OilPull	30	60		2 W.	2 Hor.	G-K
Russell, Giant	30	60		2 W.	4 Ver.	G-K
Townsend	25	50	2500	2 W.	2 Hor.	G-K
Twin City	40	65		2 W.	4 Ver.	G-K

Garden Tractors

Aro	3	6	\$ 395	2 W.	1 Ver.	G
Beeman, Junior	1 1/2	1	180	2 W.	1 Ver.	G
Beeman	1 1/2	4	265	2 W.	1 Ver.	G
Centaur	2 1/2	5	345	2 W.	1 Ver.	G-K
Do-It-All	2	6	395	2 W.	1 Ver.	G
Do-It-All	3	6	495	2 W.	1 Ver.	K
Do-It-All	4	15	495	2 W.	2 Ver.	G-K
Kinkade	1 1/2	3	190	2 W.	1 Ver.	G
N. B.		6	375	2 W.	2 Ver.	G
Utilitor	2 1/3	4	295	2 W.	4 Ver.	G
Utilitor	2 1/3	4	340	2 W.	4 Ver.	G

ABBREVIATIONS.

W.—Wheel.
T.—Track.
Ver.—Vertical.

Hor.—Horizontal.
Opp.—Opposed.
G-K—Gasoline or Kerosene.

Mechanical Specifications of 1923 Agricultural Tractors

MAKE AND MODEL	GENERAL									ENGINE										GOVERNOR		IGNITION	
	Price	Plowing Capacity (14 Ins.)	Plowing Speed (M. P. H.)	Weight Complete (Lbs.)	Wheel Base (Ins.)	Minimum Turning Diameter (Ft.)	Drawbar Type	Rating	Steering Gear Type	Make	Rated Horse Power (N. A. C.)	Number Cylinders	Bore and Stroke	Engine Type	Normal R. P. M. at Plowing Speed	Make	Type	Make of System	Impulse Starter Fitted				
Allis-Chalmers	\$ 295	1	2.40	2500	81	9-11"	Ver.	6-12	F.A.K.	Le Roi	15.63	4	3 1/2 x 4 1/2	Ver.	1000	Le Roi	Cent.	Dixie	No.				
Allis-Chalmers	1185	3	2.30	4700	78	12-0"	Uni.	15-25	F.A.K.	Midw.	27.23	4	4 1/2 x 5 1/4	Ver.	1100	Own.	Cent.	Dixie	Yes.				
Allis-Chalmers	1885	4	2.50	6150	94	12-0"	Uni.	20-35	F.A.K.	Own.	36.10	4	4 3/4 x 6 1/2	Ver.	9.30	Own.	Cent.	Dixie	Yes.				
Allwork	C 1293	3	2.75	5200	80	12-0"	Uni.	14-28	F.A.K.	Own.	40.00	4	5 x 6	Ver.	900	Own.	Cent.	Bosch	Yes.				
Allwork	D 1595	3	2.75	4800	75	9-6"	Uni.	14-28	F.A.K.	Own.	36.10	4	4 3/4 x 6	Ver.	900	Own.	Cent.	Bosch	Yes.				
Allwork		4-5	2.75	6500	80	26-0"	Ver.	20-38	F.A.K.	Own.	40.00	4	5 x 7	Ver.	900	Own.	Cent.	Bosch	Yes.				
Aultman-Taylor		3-4	2.20	7800	98 1/2	16-0"	Hor.	15-30	F.A.K.	Climax	40.00	4	5 x 6 1/2	Ver.	900	Own.	Climax	Eise	Yes.				
Aultman-Taylor		4-6	2.20	12,500	102	28-0"	Hor.	22-45	S.A.	Own.	48.40	4	5 1/2 x 8	Hor.	600	Own.	Cent.	Eise	Yes.				
Aultman-Taylor		8-10	2.20	22,500	125	32-0"	Hor.	30-60	S.A.	Own.	78.40	4	7 x 9	Hor.	550	Own.	Cent.	Eise	Yes.				
Avery		2-3	2.50	4900	90	11-0"	Hor.	8-16	S.A.	Own.	48.40	2	5 1/2 x 6	Hor.	700	Own.	Cent.	K.W.	Yes.				
Avery		3-4	2.50	7500	95	14-0"	Hor.	12-25	S.A.	Own.	33.80	2	6 1/2 x 7	Hor.	700	Own.	Cent.	K.W.	Yes.				
Avery		3-4	2.50	4500	70		Hor.	15-	F.A.K.	Own.	32.40	4	4 1/2 x 6	Hor.		Pick.	Cent.	K.W.	Yes.				
Avery		4-5	3.00	7500	80	12-0"	Hor.	20-35	F.A.K.	Own.	38.03	4	4 1/2 x 7	Hor.	700	Own.	Cent.	K.W.	Yes.				
Avery		3-4	3.50	7540	96	12-0"	Hor.	14-48	F.A.K.	Own.	34.23	4	4 1/2 x 7	Hor.	800	Own.	Cent.	K.W.	Yes.				
Avery		4-5	2.50	9750	97	14-6"	Hor.	18-36	S.A.	Own.	48.50	4	5 1/2 x 6	Hor.	800	Own.	Cent.	K.W.	Yes.				
Avery		5-6	4.00	12,500	114	20-0"	Hor.	25-50	S.A.	Own.	67.60	4	6 1/2 x 7	Hor.	700	Own.	Cent.	K.W.	Yes.				
Avery		8-10	3.00	22,000	138	20-6"	Hor.	45-65	S.A.	Own.	96.10	4	7 1/2 x 8	Hor.	500	Own.	Cent.	K.W.	Yes.				
Avery (Track Runner)		3	2.66	5,000		9-0"	Uni.		T.D.M.	Own.	25.60	4	4 x 5 1/2	Ver.	1000	Pharo	Hyd.	K.W.	Yes.				
Avery (Motor Cult)	C			3050			Hor.		F.A.K.	Own.	21.60	6	3 x 4	Ver.	1250	Own.	Cent.	K.W.	Yes.				
Avery (Road Racer)				4600			Hor.		F.A.K.	Own.	21.60	6	3 x 4	Ver.	1250	Own.	Cent.	K.W.	Yes.				
Bates (All Steel)	D	3	2.50	4000	74	20-0"	Ver.	15-25	F.A.K.	Own.	28.90	4	4 1/2 x 6	Hor.	800	Own.	Cent.	Dixie	Yes.				
Bates (Steel Mule)	H	3	3.00	3600	82 1/2	20-0"	Hor.	15-25	F.A.K.	Midw.	27.23	4	4 1/2 x 5 1/4	Ver.	1100	Simp.	Cent.	Bosch	Yes.				
Bates (Steel Mule)	F	3	3.00	4850	80	16-0"	Hor.	18-25	F.A.K.	Midw.	27.23	4	4 1/2 x 5 1/4	Ver.	1100	Simp.	Cent.	Bosch	Yes.				
Bates (Steel Mule)	G	4	3.00	6500	80 1/2	13-6"	Hor.	25-35	F.A.K.	Midw.	32.40	4	4 1/2 x 6	Ver.	1000	Simp.	Cent.	Bosch	Yes.				
Best	B	4	3.50	5500	64	12-0"	Uni.	25-35	T.D.M.	Stearns	36.10	4	4 1/2 x 6 1/2	Ver.	1190	Simp.	Cent.	Bosch	Yes.				
Best	30	4	3.06	7845		5-6"	Hor.	18-30	T.D.M.	Own.	36.10	4	4 1/2 x 6 1/2	Ver.	800	Own.	Cent.	Bosch	Yes.				
Best	60	8	2.62	18,190		7-0"	Hor.	35-55	T.D.M.	Own.	67.60	4	6 1/2 x 8 1/2	Ver.	850	Own.	Cent.	Bosch	Yes.				
Bryan	Steam	3	2.50	5500	88	14-0"	Hor.	15-30	F.A.K.	Own.	12.80	2	4 x 5	Hor.	500	Pick.	Cent.						
Case		3	2.60	4230	65	24-0"	Hor.	12-20	F.A.K.	Own.	27.23	4	4 1/2 x 5	Ver.	1050	Own.	Cent.	Bosch	Yes.				
Case		3-4	2.75	6600	76 1/2	27-3"	Hor.	15-27	F.A.K.	Own.	32.40	4	4 1/2 x 6	Ver.	900	Own.	Cent.	Bosch	Yes.				
Case		4-5	2.60	10,700	96	40-6"	Hor.	22-40	F.A.K.	Own.	48.40	4	5 1/2 x 6 1/2	Ver.	850	Own.	Cent.	Bosch	Yes.				
Case		8-10	2.60	21,200	124	52-6"	Hor.	40-72	F.A.K.	Own.	78.40	4	7 x 8	Hor.	750	Own.	Cent.	Bosch	Yes.				
Caterpillar	T35	3	3.00	4000		11-0"	Hor.	15-	T.D.M.	Own.	25.60	4	4 x 5 1/2	Ver.	1000	Own.	Cent.	Eise	Yes.				
Caterpillar	T11	4	3.00	9400	83	14-0"	Non. A.	25-	T.D.M.	Own.	36.10	4	4 1/2 x 6	Ver.	1050	Own.	Cent.	Eise	Yes.				
Caterpillar	T16	6	3.00	19,500	98	18-0"	Non. A.	40-	T.D.M.	Own.	67.60	4	6 1/2 x 7	Ver.	750	Own.	Cent.	K-W	Yes.				
Cietrac	F 745	2	3.00	1930		16-0"	Hor.	9-16	T.D.M.	Own.	16.90	4	3 1/2 x 4 1/2	Ver.	1600	Own.	Cent.	Teagle	No.				
Cietrac	W 1345	2	3.00	3455		12-0"	Hor.	12-20	T.D.M.	Own.	25.60	4	4 x 5 1/2	Ver.	1265	Own.	Cent.	Teagle	Yes.				
Eagle	F	3	2.00	5850	81		Hor.	12-22	S.A.	Own.	39.20	2	7 x 8	Hor.	450	Pick.	Cent.						
Eagle	E	4	2.00	7100	88		Hor.	12-22	F.A.K.	Own.	51.20	2	8 x 8	Hor.	450	Pick.	Cent.						
E-B	AA	3	2.70	4550	87 1/2	12-6"	Hor.	12-20	F.A.K.	Own.	36.10	4	4 1/2 x 5	Ver.	900	Own.	Cent.	K-W	Yes.				
E-B	Q	3	2.26	6500	93	15-0"	Hor.	12-20	F.A.K.	Own.	36.10	4	4 1/2 x 5	Ver.	850	Pick.	Cent.	K-W	Yes.				
E-B		4	2.26	9400	126	22-0"	Hor.	16-32	S.A.	Own.	44.10	4	5 1/2 x 7	Ver.	750	Pick.	Cent.	Simms	Yes.				
Fageol		2	2.33	3600	77		Hor.	9-12	F.A.K.	Lycom.	19.60	4	3 1/2 x 5	Ver.	1200		Cent.	Dixie	Yes.				
Fordson		2	2.75	2543	63	21-0"	Hor.	-18	F.A.K.	Own.	25.60	4	4 x 5	Ver.	1000		Cent.	Own	No.				
Frick		2	2.30	5800	92	12-6"	Hor.	12-20	F.A.K.	Erd.	25.60	4	4 x 6	Ver.	900	Erd.	Cent.	K.W.	Yes.				
Frick		3	2.13	6730	92	12-6"	Hor.	15-28	F.A.K.	Beav.	36.10	4	4 1/2 x 6	Ver.	900	Taco.	Cent.	Dixie	Yes.				
Gray		4	3.00	6200	140	12-6"	Non. A.	20-36	F.A.K.	Wauk.	32.40	4	4 1/2 x 6 1/2	Ver.	1000	Wauk.	Cent.	Bosch	Yes.				
Gray		4	3.00	6200		17-0"	Non. A.	18-36	F.A.K.	Wauk.	36.10	4	4 3/4 x 6 1/2	Ver.	950	Wauk.	Cent.	Bosch	Yes.				
Hart-Parr	20	2	3.00	3973	76	22-0"	Hor.	-20	F.A.K.	Own.	24.20	2	5 1/2 x 6 1/2	Hor.	800	Own.	Cent.	K-W	Yes.				
Hart-Parr	30	3	3.00	5220	83	24-0"	Hor.	-30	F.A.K.	Own.	33.80	2	6 1/2 x 7	Hor.	750	Own.	Cent.	K-W	Yes.				
Hart-Parr (Road)		3	3.00	7560	83	24-0"	Hor.	-30	F.A.K.	Own.	33.80	2	6 1/2 x 7	Hor.	750	Own.	Cent.	K-W	Yes.				
Heider	D 628	2	2.50	4000	90	25-0"	Uni.	9-16	F.A.K.	Wauk.	28.90	4	4 1/2 x 6 1/2	Ver.	1000	Wauk.	Cent.	Dixie	Yes.				
Heider	C 725	3	2.50	6000	96	25-0"	Uni.	12-20	F.A.K.	Wauk.	32.40	4	4 1/2 x 6 1/2	Ver.	900	Wauk.	Cent.	Dixie	Yes.				
Heider (Motor Cult)		2	2.50	2800	80	4-8"	Hor.	5-10	F.A.K.	LeRoi	15.63	4	3 1/2 x 4 1/2	Ver.	1100	LeRoi	Cent.	Dixie	Yes.				
Huber (Light Four)		3	2.50	5000	91	12-0"	Uni.	12-25	F.A.K.	Wauk.	32.40	4	4 1/2 x 6 1/2	Ver.	1000	Wauk.	Cent.	King	Yes.				
Huber (Super 4)		3	2.80	6000	91	12-3"	Uni.	15-30	F.A.K.	Midw.	32.40	4	4 1/2 x 6	Ver.	1100	Taco.	Cent.	Eise	Yes.				
International		2	2.75	3600	85	13-6"	Uni.	8-16	F.A.K.	Own.	28.90	4	4 1/2 x 5	Ver.	1000	Own.	Cent.	Dixie	Yes.				
International (McD)		3	3.00	5500	85	15-0"	Uni.	15-30	F.A.K.	Own.	32.40	4	4 1/2 x 6	Ver.	1000	Own.	Cent.	Split	Yes.				
International		4	1.80	8700	94	19-0"	Uni.	15-30	F.A.K.	Own.	44.10	4	5 1/2 x 8	Hor.	575	Own.	Cent.	Split	Yes.				
La Crosse	M	1	2.50	3000	72	8-6"	Hor.	6-12	F.A.K.	Own.	12.80	2	4 x 6	Hor.	1000	Own.	Cent.	A-K	Yes.				
La Crosse	H	3	3.00	3800	90	9-6"	Hor.	12-24	F.A.K.	Own.	28.80	2	6 x 7	Hor.	900	Own.	Cent.	A-K	Yes.				
Lauson	S 1295	3	3.00	4200	78	13-0"	Hor.	12-25	F.A.K.	Midw.	27.23	4	4 1/2 x 5 1/4	Ver.	1200	Taco.	Cent.	Dixie	Yes.				
Lauson	T 1675	4	2.50	6200		14-0"	Hor.	15-30	F.A.K.	Beav.	36.10	4	4 1/2 x 6	Ver.	1000	Taco							

Mechanical Specifications of 1923 Agricultural Tractors

ENGINE										MAIN CLUTCH		BELT PULLEY			TRANSMISSION							
FUEL SYSTEM				OILING SYSTEM	COOLING SYSTEM			Fluid	Make	Type	Diameter (Ins.)	Face (Ins.)	Normal R. P. M.	Clutch Type	Make	Number Forward Speeds	Final Drive	Drive from Gearset to Traction Members	Drive Taken Through	Drive Wheel Axle Type	Differential Lock	Drive Shaft Axle Bearings
Make and Size of Carburetor	Number and Capacity of Fuel Tanks	Water Injected?	Make of Air Cleaner	Type of System	Circulation by	Capacity of System (Gals.)																
King 7 1/2	1-G-8 1/2	No.	Bennett.	Cir. Spl.	Ther-S.	3 1/2	W	B. & B.	S. P.	10	5 1/2	1000	None.	Own.	1	Wheel.	S. & I. G.	Rim.	Dead.	No.	Plain	
King 1 1/2	1-G-20	No.	Taco.	Hol. Crk.	Pump.	10	W	Own.	E. S.	12 1/2	6 1/2	817	None.	Own.	2	Wheel.	I. G.	Rim.	Rev.	No.	Roller	
King 1 1/2	3-G-40	No.	Taco.	Hol. Crk.	Pump.	10	W	Own.	E. S.	13	7 1/2	930	None.	Own.	2	Wheel.	I. G.	Rim.	Rev.	No.	Roller	
King 1 1/2	2-5G-25K.	No.	Bennett.	Cir. Spl.	Pump.	12	W	Own.	M. D. D.	13 3/4	7 1/2	900	M. D. D.	Own.	3	Wheel.	S. G.	Rim.	Rev.	No.	Roller	
King 1 1/2	2-5G-25K.	No.	Bennett.	Cir. Spl.	Pump.	10	W	Own.	M. D. D.	11	7	900	M. D. D.	Own.	3	Wheel.	S. & W. G.	Rim.	Rev.	No.	Roller	
King 1 1/2	2-25G-5K.	No.	Bennett.	Hol. Crk.	Pump.	12	W	Own.	M. D. D.	14	7 1/2	900	M. D. D.	Own.	3	Wheel.	S. G.	Rim.	Rev.	No.	Roller	
King 1 1/2	2-6G-16K.	No.	Bennett.	Hol. Crk.	Pump.	8	W	T. Disc.	S. P.	20	8	450	S. P.	Own.	1	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	2-20G-50K.	Yes.	None.	M.F.M.O.	Pump.	80	W	Own.	C. B.	20	11	600	E. S.	Own.	2	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	2-20G-60K.	Yes.	None.	M.F.M.O.	Pump.	120	W	Own.	C. B.	24	11	550	E. S.	Own.	1	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	2-2 1/2 G-1 1/2 F	Yes.	None.	Cir. Spl.	Ther-S.	12 1/2	W	Own.	M. D. D.	17 1/2	7	750	E. S.	Own.	2	Wheel.	S. G.	Spokes	Rev.	No.	Plain	
King 1 1/2	2-2G-16K.	No.	Bennett.	M.F.M.O.	Pump.	17 1/2	W	Own.	M. D. D.	16	7 3/8	900	M. D. D.	Own.	2	Wheel.	S. G.	Axle	Live.	No.	Ball	
King 1 1/2	2-3 1/4 G-20K.	Yes.		Cir. Spl.	Ther-S.	30	W	Own.	M. D. D.	16	7 1/2	800	M. D. D.	Own.	2	Wheel.	S. G.	Spokes	Rev.	No.	Plain	
King 1 1/2	2-3 1/4 G-20K.	Yes.		Cir. Spl.	Ther-S.	30	W	Own.	M. D. D.	16	7 1/2	800	M. D. D.	Own.	2	Wheel.	S. G.	Spokes	Rev.	No.	Plain	
King 1 1/2	2-3 1/4 G-30K.	Yes.		M.F.M.O.	Pump.	33	W	Own.	M. D. D.	18	8	700	M. D. D.	Own.	2	Wheel.	S. G.	Spokes	Rev.	No.	Plain	
King 1 1/2	2-5 1/2 G-34K.	Yes.		Cir. Spl.	Ther-S.	33	W	Own.	M. D. D.	22	8 1/2	700	M. D. D.	Own.	2	Wheel.	S. G.	Spokes	Rev.	No.	Plain	
King 1 1/2	2-5G-50K.	Yes.		M.F.M.O.	Pump.	55	W	Own.	M. D. D.	26	10	600	M. D. D.	Own.	2	Wheel.	S. G.	Spokes	Rev.	No.	Plain	
King 1 1/2	2-5G-65K.	Yes.		M.F.M.O.	Pump.	55	W	Own.	M. D. D.	26	10	600	M. D. D.	Own.	2	Wheel.	S. G.	Spokes	Rev.	No.	Plain	
King 1 1/2	2-2G-23K.	No.	United	Hol. Crk.	Pump.	6 3/4	W	T. Disc.	S. P.	12	6 1/2	1000		Own.	3	Track	S. G.	Spokes	Rev.	No.	Ball	
King 1	1-10G	No.	Bennett.	Cir. Spl.	Ther-S.	6 3/4	W	Own.	M. D. D.	10	5 1/4	600		Own.	3	Wheel.	S. G.	Spokes	Dead.	No.	Roller	
King 1	1-20G	No.	Bennett.	Cir. Spl.	Ther-S.	6 3/4	W	Own.	M. D. D.	10	5 1/4	600		Own.	3	Wheel.	S. G.	Spokes	Dead.	No.	Roller	
Own 1 1/2	2-3G-15K.	Yes.	Own.	Hol. Crk.	Pump.	5	W	Own.	C. B.	10	7	800	E. S.	Own.	3	Wheel.	I. G.	Rim.	Dead.	No.	Roller	
Ben. 1 1/2	2-8G-10K.	Yes.	R-W.	Hol. Crk.	Pump.	6	W	B. & B.	S. P.	12	8 1/2	850	S. P.	Own.	2	Wheel.	S. G.	Axle	Dead.	No.	Roller	
Ben. 1 1/2	2-8G-10K.	Yes.	R-W.	Hol. Crk.	Pump.	6	W	B. & B.	S. P.	12	8 1/2	850	S. P.	Own.	2	Track	S. G.	Axle	Dead.	Yes.	Roller	
King 1 1/2	1-26G	No.	R-W.	Hol. Crk.	Pump.	10	W	T. Disc.	S. P.	12	8 1/2	850	S. P.	Own.	2	Track	S. G.	Axle	Dead.	Yes.	Roller	
Schab 1 1/2	1-40G	No.	Pomona.	Hol. Crk.	Pump.	14	W	M. & E.	M. D. D.	12	9	1190	None.	Own.	3	Track	I. G.	Axle			Ball	
Ensign 1 1/2	2-2 1/2 G-28K.	No.	Pomona.	Hol. Crk.	Pump.	15	W	Own.	M. D. D.	12	7	800	None.	Own.	2	Track	B. G.				Roller	
Ensign 2	2-2 1/2 G-52K.	No.	Pomona.	Cir. Spl.	Pump.	18	W	Own.	S. P.	16	10	650	None.	Own.	2	Track	S. G. B. G.				Roller	
Ensign 2	1-30K	No.	None.	M.F.M.O.				None.		18	7	300	None.	Own.	Var.	Wheel.	S. G.	Axle	Live.	Yes.	Roller	
King 1 1/2	2-2 1/2 G-17 1/2 K	No.	Own	Hol. Crk.	Pump.	10	W	T. Disc.	S. P.	14 1/4	6 3/4	1050	S. P.	Own.	2	Wheel.	S. G.	Spokes	Live.	Yes.	Roller	
King 1 1/2	2-2 1/2 G-20K.	No.	Own	Hol. Crk.	Pump.	11	W	B. & B.	S. P.	16	6 1/2	900	S. P.	Own.	2	Wheel.	S. G.	Spokes	Live.	Yes.	Roller	
King 1 1/2	2-3 1/4 G-2 1/2 F	Yes.	Own	Hol. Crk.	Pump.	15 1/2	W	Own.	E. S.	16 1/2	8 1/2	850	E. S.	Own.	2	Wheel.	S. G.	Spokes	Rev.	Yes.	Roller	
King 2 1/2	2-9G-52K.	Yes.	Own	Hol. Crk.	Pump.	6	W	T. Disc.	S. P.	19 1/2	10 1/2	750	S. P.	Own.	2	Wheel.	S. G.	Spokes	Rev.	Yes.	Roller	
King 1 1/2	1-19G	No.	Dailey	Hol. Crk.	Pump.	6	W	Own.	M. D. D.	11 1/2	6 1/2	1000	S. G.	Own.	3	Track	S. G.				None	
Schab 1 1/2	1-46G	No.	Donald.	Hol. Crk.	Pump.	7 1/2	W	Own.	M. D. D.	12	8 1/2	1000	J. C.	Own.	3	Track	S. G.				Roller	
King 1 1/2	1-46G	No.	Donald.	Hol. Crk.	Pump.	13 1/2	W	Own.	M. D. D.	14	10 1/2	850	J. C.	Own.	3	Track	S. G.				Roller	
Tillot 1	2-1 1/2 G-6K	No.	Own	Cir. Spl.	Pump.	3 3/8	W	B. & B.	S. P.	7	5	1600	None.	Own.	1	Track	S. G.	Axle			Ball	
King 1 1/2	2-2 1/2 G-11K	No.	Own	Hol. Crk.	Pump.	3 3/8	W	B. & B.	S. P.	8	6	1265	None.	Own.	1	Track	S. G.	Axle			Roller	
Schab 1 1/2	2-4G-12K.	Yes.	Own	M.F.M.O.	Pump.	12	W	Own.	E. S.					Own.	2	Wheel.	S. G.	Rim.	Rev.	No.	Roller	
Schab 1 1/2	2-5G-18K.	Yes.	Own	M.F.M.O.	Pump.	15	W	Own.	E. S.					Own.	2	Wheel.	S. G.	Rim.	Rev.	No.	Roller	
Strom 1 1/2	2-4G-20K.	Yes.	Bennett.	Cir. Spl.	Pump.	7 1/2	W	Own.	Cone.					Own.	2	Wheel.	I. G.	Spokes	Rev.	No.	Plain	
Ben 1 1/2	2-4G-16K.	Yes.	Bennett.	Cir. Spl.	Pump.	9	W	Own.	Cone.					Own.	3	Wheel.	I. G.	Spokes	Dead.	No.	Plain	
Strom 1 1/2	2-5G-35K.	Yes.	Bennett.	Cir. Spl.	Pump.	10	W	Own.	Cone.					Own.	2	Wheel.	I. G.	Spokes	Dead.	Yes.	Plain	
Tillot 1	1-12G	No.	Own	Cir. Spl.	Pump.		W	Own.	E. S.					Own.	1	Wheel.	S. G.	Axle	Live.	Yes.	Roller	
Holly 1 1/2	2-1 1/2 G-21K.	Yes.	Own	Cir. Spl.	Ther-S.	12	W	Own.	M. D. D.	9 1/2	6 1/2	1000		Own.	3	Wheel.	Worm.	Axle	Live.	No.	Roller	
King 1 1/2	2-3G-20K.	No.	King	Cir. Spl.	Pump.	7 3/4	W	Own.	E. S.	13	7	900		Nutt.	2	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
Ben 1 1/2	2-3G-20K.	No.	United	Hol. Crk.	Pump.	9 3/4	W	Own.	E. S.	13	7	900		Nutt.	2	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
Ben 1 1/2	1-35G	No.	Bennett.	Cir. Spl.	Pump.	10	W	Own.	Cone.					Own.	2	Drum.	Chain.	Rim.	Rev.	No.	Plain	
Ben 1 1/2	1-34G	No.	Bennett.	Cir. Spl.	Pump.	8	W	Own.	Cone.					Own.	2	Drum.	Chain.	Rim.	Rev.	No.	Plain	
O. King 1 1/2	2-1G-14K.	Yes.	Own	M.F.M.O.	Pump.	7 3/4	W	Own.	C. B.	13	6 1/2	800	C. B.	Own.	2	Wheel.	I. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	2-1G-23K.	Yes.	Own	M.F.M.O.	Pump.	11	W	Own.	C. B.	14	8 1/4	750	C. B.	Own.	2	Wheel.	I. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	2-1G-23K.	Yes.	Own	M.F.M.O.	Pump.	11	W	Own.	C. B.	14	8 1/4	750	C. B.	Own.	2	Wheel.	I. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	2-7G-14K.	Yes.	Bennett.	Cir. Spl.	Pump.	10	W	Own.	F. D.	12	6	750	F. D.	Own.	7	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	2-7G-14K.	Yes.	Bennett.	Cir. Spl.	Pump.	7	W	Own.	F. D.	14	7	725	F. D.	Own.	7	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	1-9G	No.	Bennett.	Cir. Spl.	Ther-S.	10	W	Own.	F. D.	8	5	750	F. D.	Own.	7	Wheel.	Chain.	Rim.	Dead.	No.	Roller	
King 1 1/2	2-2 1/2 G-22K	Yes.	Bennett.	Cir. Spl.	Pump.	8	W	Own.	E. S.	13	7	1000	E. S.	Own.	2	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
King 1 1/2	1-24 1/2 G	No.	United	Hol. Crk.	Pump.	11 1/2	W	Own.	M. D. D.	13	7	1100	M. D. D.	Own.	2	Wheel.	S. G.	Rim.	Rev.	No.	Plain	
Ensign 1 1/2	2-1 1/2 G-11 1/2 K	No.	Own	Cir. Spl.	Ther-S.	11	W	Own.	M. D. D.	12 1/2	8 1/2	625	M. D. D.	Own.	3	Wheel.	Chain.	Spokes	Dead.	Yes.	Roller	
Ensign 1 1/2	2-1G-17K.	Yes.	Own	Cir. Spl.	Ther-S.		W	Own.	M. D. D.	16 3/4	9	595	M. D. D.	Own.	3	Wheel.	S. G.	Axle	Live.	Yes.	Roller	
Qwn 1 1/2	1-24K	Yes.	Own	M.F.M.O.	Pump.	40	W	Own.	F. D.	18		575	F. D.	Own.	2	Wheel.	Chain.	Spokes	Dead.	Yes.	Roller	
King 1 1/2	2-1G-13K.	No.	Own	M.F.M.O.	Pump.	8	W	Own.						Own.	1	Wheel.	I. G.	Rim.	Dead.	Yes.	Plain	
King 1 1/2	2-5G-25K.	Yes.	Bennett.	M.F.M.O.	Pump.	10	W	Own.	C. B.				C. B.	Own.	1	Wheel.	I. G.	Rim.	Rev.	Yes.	Roller	
King 1 1/2	2-2 1/2 G-18K	Yes.	Own	Cir. Spl.	Pump.	10	W	Own.	E. S.	14	7	800	Fric.	Own.	2	Wheel.	I. G.	Spokes	Dead.</			

Mechanical Specifications of 1923 Agricultural Tractors—Continued

MAKE AND MODEL	GENERAL										ENGINE									
	Price	Plowing Capacity (14 Ins.)	Plowing Speed (M. P. H.)	Weight Complete (Lbs.)	Wheel Base (Ins.)	Minimum Turning Diameter (Ft.)	Drawbar Type	Rating	Steering Gear Type	Make	Rated Horse Power (N. A. C.)	Number Cylinders	Bore and Stroke	Engine Type	Normal—R. P. M. at Plowing Speed	GOVERNOR		IGNITION		
																Make	Type	Make of System	Impulse Starter Fitted	
O'I Pull		6	2.00	12,820	103	21-0"	Hor.	20-40	F.A.K.	Own.	51.20	2	8 x10	Hor.	450	Own.	Cent.	Bosch.	Yes	
Oil Pull		8-10	1.90	26,700	141		Hor.	30-60	S.A.	Own.	80.00	2	10 x12	Hor.	375	Own.	Cent.	Bosch.	No.	
Pioneer	G	4	2.50	6500	89	24-0"	Hor.	18-36	F.A.K.	Own.	48.40	4	5½x6	Hor.	750	Pierce.	Cent.	K-W.	Yes	
Pioneer	C	10	2.25	24,000	156	40-0"	Non. A.	40-75	F.A.K.	Own.	78.40	4	7 x8	Hor.	265	Own.	Cent.	K-W.	Yes	
†† Russell (Junior)		2-3	3.70		92	13-0"	Hor.	12-24		Wauk.	32.40	4	4½x5½	Ver.	1000	Wauk.	Cent.	Split.		
Russell (Little Boss)		3-4	2.40	6000	96½	29-6"	Hor.	15-30	F.A.K.	Climax.	40.00	4	5 x6½	Ver.	950	Climax.	Cent.	Bosch.	Yes	
Russell (Big Boss)		4-5	2.40	7900	109	33-6"	Hor.	20-40	F.A.K.	Climax.	48.40	4	5½x7	Ver.	900	Climax.	Cent.	Bosch.	Yes	
†† Russell (Giant)		8-10	3.50		140	19-0"	Hor.	30-60		Own.	102.40	4	8 x10	Ver.	525	Pick.	Cent.	Simms		
† Shaw-Enochs (Grader)				4400	153½		Uni.		S. A.	LeRoi.	15.63	4	3½x4½	Ver.	1200	LeRoi.	Cent.	Eise	No.	
Stinson	\$1635	3-4	3.00	7100	114	12-0"	Ver.	18-36	F.A.K.	Beav.	36.10	4	4½x6	Ver.	1000	Taco.	Cent.	Dixie.	Yes	
Titan		3	2.75	5710	91	14-0"	Uni.	10-20	F.A.K.	Own.	33.80	2	6½x8	Hor.	575	Own.	Cent.	Eise	Yes	
† Topp-Stewart	3500	4	2.50	7800	100	12-0"	Hor.	30-45	S.A.	Wauk.	36.10	4	4½x6½	Ver.	950	Wauk.	Cent.	Eise	Yes	
Toro	675	2	2.75	2900			Uni.	6-10	F.A.K.	LeRoi.	15.63	4	3½x4½	Ver.	1200	Own.	Cent.	Eise	No.	
Townsend	800	2-3	2.50	4500	78	20-0"	Hor.	10-20	F.A.K.	Own.	33.80	2	6½x7	Hor.	550	Own.	Cent.	K-W.	Yes	
Townsend	1350	3-4	2.50	6500	96	24-0"	Hor.	15-30	F.A.K.	Own.	39.20	2	7 x8	Hor.	500	Own.	Cent.	K-W.	Yes	
Townsend	2500	4-8	2.50	11,500	102	30-0"	Hor.	25-50	F.A.K.	Own.	57.80	2	8½x10	Hor.	475	Own.	Cent.	K-W.	Yes	
Traylor	500	1	2.25	1750	76	20-0"	Hor.	6-12	F.A.K.	LeRoi.	15.63	4	3½x4½	Ver.	1000	LeRoi.	Cent.	Split.	Yes	
Twin City		3	2.90	4550	84	12-6"	Hor.	12-20	F.A.K.	Own.	28.90	4	4½x6	Ver.	1000	Own.	Cent.	Bosch.	Yes	
Twin City		5	2.90	8100	97	15-0"	Hor.	20-35	F.A.K.	Own.	48.40	4	5½x6½	Ver.	900	Own.	Cent.	Bosch.	Yes	
Twin City		8	2.00	23,700	144	42-0"	Hor.	40-65	F.A.K.	Own.	96.10	4	7½x9	Ver.	535	Own.	Cent.	K-W.	Yes	
Uncle Sam	C-20	1235	2-3	3.50	3000	72	12-0"	Hor.	12-20	F.A.K.	Weid.	25.60	4	4 x5½	Ver.	1200	Duplex.	Suct.	Dixie.	Yes
Uncle Sam	B-19	1985	3-4	3.75	4650	85	13-0"	Hor.	20-30	F.A.K.	Beav.	36.10	4	4½x6	Ver.	1000	Duplex.	Cent.	Dixie.	Yes
Uncle Sam	D-21	1895	3-4	3.75	4600	85	13-0"	Hor.	20-30	F.A.K.	Beav.	36.10	4	4½x6	Ver.	1000	Duplex.	Cent.	Dixie.	Yes
†† Wallis	K		2-3	3.50	3560	84	10-10"	Non. A.	15-25	F.A.K.	Own.	28.90	4	4½x5½	Ver.	900	Own.	Hyd.	Berling.	
Waterloo Boy	N	675	3	3.00	5869	89	14-0"	Hor.	12-25	F.A.K.	Own.	33.80	2	6½x7	Hor.	750	Own.	Cent.	Split.	Yes
Wetmore		1185	3	3.50	2900	72	15-0"	Hor.	12-25	F.A.K.	Wauk.	25.60	4	4 x5½	Ver.	1050	Wauk.	Cent.	Split.	Yes
Wisconsin		1750	3-4	3.50	5600	90	11-0"	Hor.	16-30	F.A.K.	Climax.	40.00	4	5 x6½	Ver.	800	Climax.	Cent.	Eise	Yes
Wisconsin		2550	4-5	3.50	7500		Hor.	22-40	F.A.K.	Climax.	48.40	4	5½x7	Ver.	800	Climax.	Cent.	Eise	Yes	
Yuba (Ball Tread)		2750	3	2.25	5750		Hor.	15-25	S.A.	Wis.	28.90	4	4½x6	Ver.	900	Own.	Cent.	Bosch.	Yes	
Yuba (Ball Tread)		4250	6	2.08	10,130		Uni.	25-40	S.A.	Wis.	52.90	4	5½x7	Ver.	700	Own.	Cent.	Bosch.	Yes	

††Industrial Tractor.

††Taken from 1922 Specifications.

ABBREVIATIONS

DRAWBAR TYPE—F. A. K.—Front Axle Knuckle; S. A.—Swinging Axle; T. D. M.—Thru Driving Members.
STEERING GEAR TYPE—F. A. K.—Front Axle Knuckle; S. A.—Swinging Axle; T. D. M.—Thru Driving Members.
ENGINE—Midw.—Midwest; Lyco.—Lycoming; Beav.—Beaver; Wauk.—Waukesha; Weid.—Weidley; Wis.—Wisconsin; Ver.—Vertical; Hor.—Horizontal; Opp.—Opposed; "L" H.—"L" Head; "T" H.—"T" Head; I. H.—In Head; Pick.—Pickering; Simp.—Simplex; Cent.—Centrifugal; Elec.—Electrical; Suct.—Suction; Hyd.—Hydraulic; Eise.—Eisemann; Split.—Splitdorf; A. K.—Atwater-Kent; King.—Kingston; Ben.—Bennett; Strom.—Stromberg; Tillot.—Tillotson; Scheb.—Schebler; Gra.—Gravity; Pres.—Pressure; Vac.—Vacuum; G.—Gasoline; K.—Kerosene; Donald.—Donaldson; Cir. Spl.—Circulating Splash; Hol. Crk.—Hollow Crank Shaft; M. F. M. O.—Multifed Mechanical Oilier; Ecc.—Eccentric; Perf.—Perfax; Sh. John.—Shotwell-Johnson; Brem.—Bremmer; Ther-S.—Thermo-Siphon; W.—Water; O.—Oil.

Mechanical Specifications of 1923 Garden Tractors

MAKE and MODEL	GENERAL								ENGINE						
	Price	Type of Steering	Size Plow Recommended	Number Plows Recommended	Plowing or Cultivating Speed (M. P. H.)	Weight (Lbs.)	Drawbar Type	Rating	Make	H. P. Rating (N.A.C.C.)	Normal R. P. M. at Plowing Speed	Number Cylinders	Bore and Stroke	Engine Type	
Aro.....	\$ 385	Wheel....	12"	1	2-3	1000	Non. A...	3-6	Own.....	8.10	900	1	4 1/2x5	Ver.....	
Beeman (Junior).....	180	H. Bars..	None	0		190	Uni.....	1 1/2-1	B & S....	2.50		1	2 1/2x2 1/2	Ver.....	
Beeman.....	265	H. Bars..	7"	1	3/4-3	550	Uni.....	1 1/2-4	Own.....	4.90	800	1	3 1/2 x 4 1/2	Ver.....	
†† Bolens.....	180	H. Bars..	None	1-3		190	Hor.....		B & S....	2.50	1200	1	2 1/2x2 1/2	Ver.....	
Centaur.....	345	H. Bars..	9"-10"	1	1-3	700	Uni.....	2 1/2-5	New Way	8.10	900	1	4 1/2x4 1/2	Ver.....	
Do-It-All (Jack).....	395		9"	1		750		2-6	Own.....	5.25	1500	1	3 1/2x3 1/2	Ver.....	
Do-It-All (Baby).....	495		10"	1		1200		3-6	Own.....	8.10	700	1	4 1/2x5	Ver.....	
Do-It-All (Twin Twelve).....	495		10"-12"	1		800		4-15	Own.....	4.55	1500	2	3 1/2x3 1/2	Ver.....	
Kinkade.....	190	H. Bars..	5"	1	1 1/2-2 1/2	180	Uni.....	1 1/2-3	Own.....	3.80	1000	1	3x3	Ver.....	
NB.....	375	H. Bars..	9"	1	1 1/2-3	750	Non. A...	-6	Own.....	6.50	1500	2	2 1/2x4	Ver.....	
Utilitor.....	501	H. Bars..	10"	1	2 1/2	750	Uni.....	2 1/2-4	Own.....	19.60	800	4	3 1/2x4 1/2	Ver.....	
Utilitor.....	501-A	H. Bars..	10 1/2"	1	2 1/2	1000	Uni.....	2 1/2-4	Own.....	19.60	800	4	3 1/2x4 1/2	Ver.....	

ABBREVIATIONS

GENERAL: Rid.—Riding; Wal.—Walking; R. or W.—Riding or Walking; H. Bars—Handle Bars; Non-A.—Non-Adjustable; Hor.—Horizontal; Uni.—Universal; B. & S.—Briggs and Stratton; Ver.—Vertical; "L" H.—"L" Head; I. H.—In Head; Cent.—Centrifugal; Elec.—Eisemann; Scheb.—Schebler; King.—Kingston; Cart.—Carter; Gas.—Gasoline;

Mechanical Specifications of 1923 Agricultural Tractors—Continued

ENGINE									MAIN CLUTCH		BELT PULLEY				TRANSMISSION							
FUEL SYSTEM				OILING SYSTEM	COOLING SYSTEM				Make	Type	Diameter (Ins.)	Face (Ins.)	Normal R. P. M.	Clutch Type	Make	Number Forward Speeds	Final Drive	Drive from Gearset to Traction Members	Drive Taken Through	Drive Wheel Axle Type	Differential Lock	Drive Shaft Axle Bearings
Make and Size of Carburetor	Number and Capacity of Fuel Tanks	Water Injected?	Make of Air Cleaner	Type of System	Circulation by	Capacity of System (Gals.)	Fluid															
Own... 2 1/4	2-1G-45K.	Yes...	Donald...	Cir. Spl.	Pump...	17	O	Own...	E. S.	26	9	450	Spec...	Own...	12	Wheel...	S. G.	Rim...	Rev...	No...	Roller	
Own... 3 1/4	2-3G-70K.	Yes...	None...	Cir. Spl.	Pump...	70	O	Own...	E. S.	36	11	375	Spec...	Own...	1	Wheel...	S. G.	Rim...	Dead...	No...	Plain	
King... 2 1/2	1-25G.	Yes...	Bennett...	M. F. M. O.	Pump...	20	W	Own...	M. D. D.				M. D. D.	Own...	3	Wheel...	S. G.	Spokes...	Rev...	No...	Roller	
King... 2 1/2	2-70G-30K.	Opt...	Bennett...	M. F. M. O.	Pump...	35	W	Own...	M. D. D.	17 1/2	15	625	M. D. D.	Own...	3	Wheel...	S. G.	Spokes...	Rev...	No...	Plain	
King... 1 1/4	2-3G-18K.	Yes...	Bennett...	Cir. Spl.	Pump...	6	W	Own...		12	6	877		Own...	2	Wheel...	S. G.			No...		
King... 1 1/4	2-3 1/2 G-21 1/2 K.	Yes...	Bennett...	Hol. Crk.	Pump...	8	W	Own...	E. S.	12 1/2	7	833	None...	Own...	12	Wheel...	S. G.	Rim...	Dead...	No...	Roller	
King... 1 1/4	2-5G-30K.	Yes...	Bennett...	Hol. Crk.	Pump...	9 1/2	W	Own...	E. S.	12 1/2	8	835	None...	Own...	12	Wheel...	S. G.	Rim...	Dead...	No...	Roller	
King... 1 1/4	2-22G-88K.	Yes...	Bennett...	M. F. M. O.	Pump...	10	W	Own...		24	10	525	None...	Own...	2	Wheel...			Dead...			
Scheb... 1	1-20G.	No...	United...	Cir. Spl.	Ther-S.	7	W	B. & B.	S. P.				None...	Own...	2	Wheel...	Worm...	Axle...	Live...	No...	B. & R.	
King... 1 1/4	2-6G-26K.	No...	Rains...	Hol. Crk.	Pump...	10	W	Own...	C. B.	12	8	1000	C. B.	Own...	1	Wheel...	S. G.	Axle...	Live...	No...	Plain	
Ensign... 1 1/2	1-16K.	Yes...	Own...	M. F. M. O.		40	W	Own...	F. D.	18	8 1/2	575	F. D.	Own...	2	Wheel...	Chain...	Spokes...	Dead...	Yes...	Roller	
Strom... 1 1/2	1-25G.	No...	Bennett...	Cir. Spl.	Pump...	12	W	Hill...	M. D. D.	Opt...			Opt...	Own...	3	Wheel...	S. & I. G.	Rim...	Live...	No...	Roller	
King... 1 1/2	1-15G.	No...	Own...	Cir. Spl.	Ther-S.		W	Own...	C. B.	8	5	1200	None...	Own...	2	Wheel...	S. G.	Spokes...	Dead...	Yes...	Roller	
Own... 1 1/2	1-14K.	Yes...	Opt...	M. F. M. O.	Pump...	50	W	Own...	Spec...	18	7	550	Spec...	Own...	1	Wheel...	S. G.	Rim...	Live...	No...	Plain	
Own... 2 1/2	1-18K.	Yes...	Opt...	M. F. M. O.	Pump...	75	W	Own...	Spec...	20	8	500	Spec...	Own...	1	Wheel...	S. G.	Rim...	Live...	No...	Plain	
Own... 2 1/2	1-30K.	Yes...	Opt...	M. F. M. O.	Pump...	100	W	Own...	Spec...	22	10	475	Spec...	Own...	1	Wheel...	S. G.	Axle...	Live...	No...	Plain	
King... 1 1/2	1-10G.	No...	Orem...	Hol. Crk.	Ther-S.	4	W	B. & B.	S. P.	8	6	1000	None...	Own...	1	Wheel...	I. G.	Rim...	Dead...	No...	Plain	
Holly... 1 1/2	2-1 1/2 G-23K.	No...	Donald...	Hol. Crk.	Pump...	10 1/2	W	T. Disc.	S. P.	16	6 1/2	650	None...	Own...	2	Wheel...	S. G.	Axle...	Live...	No...	Roller	
Holly... 2 1/2	2-1 1/2 G-40K.	No...	Bennett...	Hol. Crk.	Pump...	18	W	T. Disc.	S. P.	21	8 1/2	466	None...	Own...	2	Wheel...	S. G.	Axle...	Live...	No...	Roller	
Holly... 2 1/2	2-10G-95K.	Yes...	None...	M. F. M. O.	Pump...	130	W	Own...	C. B.	23	10 1/2	535	C. B.	Own...	1	Wheel...	S. G.	Rim...	Rev...	No...	Plain	
King... 1 1/4	1-20G.	No...	Bennett...	Hol. Crk.	Pump...		W	B. & B.	S. P.	16	6	1000	None...	Own...	2	Wheel...	Chain...	Axle...	Live...	No...	Roller	
Ben... 1 1/2	2-5G-22K.	No...	Bennett...	Hol. Crk.	Pump...		W	T. Disc.	S. P.	11	9 1/4	1000	J. C.	Nutt...	2	Wheel...	S. G.	Axle...	Live...	No...	Roller	
Ben... 1 1/2	2-5G-22K.	No...	Bennett...	Hol. Crk.	Pump...		W	T. Disc.	S. P.	11	9 1/4	1000	J. C.	Nutt...	2	Wheel...	S. G.	Axle...	Live...	No...	Roller	
Ben... 1 1/4	2-20G-20K.	No...	Bennett...	Cir. Spl.	Pump...	6	W	T. Disc.	S. P.					Own...	2	Wheel...	S. G.	Spokes...	Live...	No...	Roller	
Scheb... 1 1/2	2-1G-20K.	Yes...	Own...	M. F. M. O.	Pump...	13	W	Own...	C. B.	14	8	750	C. B.	Own...	2	Wheel...	I. G.	Rim...	Rev...	No...	Roller	
Scheb... 1 1/2	2-2 1/2 G-12K.	No...	None...	Hol. Crk.	Pump...	7 1/2	W	Fuller...	M. D. D.	12	7	950	None...	Full...	3	Wheel...	I. G.	Spokes...	Dead...	No...	Roller	
Strom... 1 1/2	2-6G-20K.	No...	None...	Hol. Crk.	Pump...	14	W	T. Disc.	S. P.	16	8	575	S. P.	Foot...	2	Wheel...	S. G.	Rim...	Rev...	No...	Plain	
Strom... 1 1/2	2-6G-25K.	No...	None...	Hol. Crk.	Pump...	16	W	T. Disc.	S. P.	16	9	575	S. P.	Foot...	2	Wheel...	S. G.	Rim...	Rev...	No...	Plain	
Strom... 1 1/4	2-4G-21K.	No...	Pomona...	Hol. Crk.	Pump...	5 1/2	W	Paragon...	M. D. D.	12	6 1/2	900	S. P.	Own...	2	Track...	S. G.				Roller	
Strom... 1 1/2	2-8G-38K.	No...	Pomona...	Hol. Crk.	Pump...	9	W	Paragon...	M. D. D.	14	8 1/2	700	S. P.	Own...	2	Track...	S. G.				Roller	

CLUTCHES—B. & B.—Borg & Beck; T. Disc.—Twin-Disc; M. & E.—Merchant & Evans; S. P.—Single Plate; E. S.—Expanding Shoe; M. D. D.—Multiple Dry Disc; C. B.—Contracting Bands; F. D.—Friction Drum; Frie.—Friction; J. C.—Jaw Clutch.

TRANSMISSION—Nutt.—Nuttall; Full.—Fuller; S. G.—Sliding Gear; J. C.—Jaw Clutch; Frie.—Friction; S. & I. G.—Spur and Internal Gear; I. G.—Internal Gear; S. G.—Sliding Gear and Bevel Gear; S. & W. G.—Spur and Worm Gear; Rev.—Revolving; B. & R.—Ball and Roller; No F.—No Frame.

Mechanical Specifications of 1923 Garden Tractors

IGNITION	FUEL SYSTEM				OILING SYSTEM	COOLING SYSTEM		CLUTCH		BELT PULLEY		TRANSMISSION	
	Make and Size of Carburetor (Ins.)	Fuel Recommended	Number and Capacity of Fuel Tanks	Make of Air Cleaner	Type of System	Cooled by	Circulation by	Make	Type	R. P. M.	Diameter and Face	Type	Final Drive
Berling...	Scheb-1.	Gas...	1-2 1/2 G.	Donald...	Cir-Spl.	Water...	Ther-S.	Own...	E. B.	900	6-4 1/2		Axle...
Own...	B & S-1 1/2	Gas...	1 1/2 G.	Donald...	Cir-Spl.	Air...	Fan...	Own...	Special.				Spokes...
Heinse...	King-3/4	Gas...	1 1/2 G.	Donald...	Cir-Spl.	Water...	Ther-S.	Own...	Cone...	800	3 1/2-4 1/2		Rim...
Own...	B & S-3/4	Gas...	1 1/2 G.	Donald...	Cir-Spl.	Air...	Fan...	Own...				200.	
Bosch...	Cart-1.	G-K.	1-2 1/2 G.	Own...	Splash...	Air...	Fan...	New Way.	MDD...	900	4-6	S-G.	Axle...
Own...	Gas...	1-5 G.	None...	Cir-Spl.	Air...			Own...		1500	3-3	J. C.	
Own...	Own-3/4	Ker...	1-1 K.	None...	Cir-Spl.	Water...		Own...	Jaw...	1800	2-2	J. C.	Axle...
Own...	G-K.	1 5/8 G.	None...	Cir-Spl.	Air...			Own...		1500	4-4	S. G.	Axle...
Berling...	Scheb-1 1/2	Gas...	2-1G-1 1/2 O.	Own...	Cir-Spl.	Air...	Fan...	Own...	Jaw...	1000	3-3	J. C.	Spokes...
Simms...	King-3/4	Gas...	2-2G-3/4 O.	Bennett...	Cir-Spl.	Water...	Ther-S.	Own...		2800	5 1/2-4 1/2	Plan.	Rim...
Eise...	Holly-1 1/2	Gas...	2-1 1/2 G-1 1/2 O.	Own...	Cir-Spl.	Water...	Ther-S.	Own...	Cone...	1200	4 1/2-3 1/2		
Eise...	Holly-1 1/2	Gas...	2-1 1/2 G-1 1/2 O.	Own...	Cir-Spl.	Water...	Ther-S.	Own...	Cone...	1200	4 1/2-3 1/2		

K.—Kerosene; G.—Gasoline or Kerosene; Donald.—Donaldson; Cir Spl.—Circulating Splash; Ecc.—Eccentric; Sh. John.—Shotwell-Johnson; Ther-S.—Thermo-Siphon; E. B.—Expanding Band; M. D. D.—Multiple Dry Disk; H. Lever.—Hand Lever; H. B. Grip.—Handle Bar Grip.

TRANSMISSION S. G.—Sliding Gear; J. C.—Jaw Clutch; Plan.—Planetary; Sp. G.—Spur Gear; I. G.—Internal Gear; No F.—No Frame.

Mechanical Specifications of

MAKE AND MODEL	GENERAL						ENGINE									
	Plant Voltage	Drive	Starts Automatically?	Stops Automatically?	Type of Plant	Make	No. Cylinders, Bore and Stroke	Rated H. P. (N. A. C. C.)	Cycle Type	COOLING				GOVERNOR		
										Medium	Circulation Through	Valve Arrangement	Oiling System	Type	Normal Speed	Type of Ignition System
Alamo..... Silent	32	Direct.	.....	Yes.....	Unit.....	Own.....	4-2 1/4 x 3 1/2	8.10	4	Water...	Radiator...	Rot. Slec.	Cir-spl....	Elec.....	2000	Mag.....
Cushman..... 15	32	Belt.....	Yes.....	Yes.....	Unit.....	Own.....	1-4 x 4	6.40	4	Water...	Tank.....	"L" H.	Cir-spl....	Cent.....	800	Bat.....
C-Y-C.....	32	Direct.	No.....	No.....	Unit.....	Own.....	1-3 1/4 x 4	5.62	4	Water...	Tank.....	"L" H.	Cir-spl....	U. U. R. B.	1250	Bat.....
Delco-Light..... 1244	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 x 5	3.60	4	Air.....	.....	L.H.	Splash....	U. U. R. B.	1250	Bat.....
Delco-Light..... 346	65	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 6	5.62	4	Air.....	.....	L.H.	Splash....	Elec.....	1250	Bat.....
Delco-Light..... 316	110	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 6	5.62	4	Air.....	.....	L.H.	Splash....	Elec.....	1250	Bat.....
Delco-Light..... 320	110	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 6	5.62	4	Air.....	.....	L.H.	Splash....	U. U. R. B.	1250	Bat.....
Delco-Light..... 864	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-2 1/2 x 5	2.50	4	Air.....	.....	L.H.	Splash....	U. U. R. B.	1100	Bat.....
Delco-Light..... 346	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 6	5.62	4	Air.....	.....	L.H.	Splash....	U. U. R. B.	1250	Bat.....
Delco-Light..... 1295-1296	110	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 x 5	3.60	4	Air.....	.....	L.H.	Splash....	U. U. R. B.	1250	Bat.....
Delco-Light..... 1286	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 x 5	3.60	4	Air.....	.....	L.H.	Splash....	Cent.....	1250	Bat.....
Delco-Light..... 621	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-2 1/2 x 3	2.50	4	Air.....	.....	L.H.	Splash....	U. U. R. B.	1450	Bat.....
Electron.....	32	Direct.	No.....	Yes.....	Unit.....	Own.....	4-	.....	4	Water...	Radiator...	L.H.	Splash....	Elec.....	1600	Mag.....
Everlite..... A	32-40	Direct.	Yes.....	Yes.....	Unit.....	Own.....	1-2 1/4 x 4	3.02	4	Water...	Radiator...	"L" H.	Splash....	U. U. R. B.	1400	Bat.....
Fairbanks-Morse..... 1 1/2	30-42	Belt.....	No.....	No.....	Unit.....	Own.....	1-3 1/4 x 5	4.90	4	Water...	Radiator...	L.H.	.....	Cent.....	500	Bat.....
Fairbanks-Morse..... 3	30-42	Belt.....	No.....	No.....	Unit.....	Own.....	1-4 1/2 x 6	8.10	4	Water...	Radiator...	L.H.	.....	Cent.....	500	Bat.....
Genco..... A&B	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 3	4.22	4	Water...	Radiator...	L.H.	Splash....	U. U. R. B.	1200	Bat.....
Genco..... C&D	110	Direct.	No.....	Yes.....	Unit.....	Own.....	2-3 1/4 x 4	8.45	4	Water...	Radiator...	L.H.	Splash....	U. U. R. B.	1200	Mag.....
Globe.....	32-40	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/4 x 4	3.02	4	Water...	Tank.....	"L" H.	Splash....	Cent.....	1300	Bat.....
Globe.....	125	Direct.	No.....	No.....	Unit.....	LeRoi.....	4-3 1/2 x 4 1/2	15.63	4	Water...	Radiator...	"L" H.	Cir-spl....	Cent.....	1200	Mag.....
Holt..... C	110	Direct.	Yes.....	Yes.....	Unit.....	Own.....	1-3 x 3	3.60	4	Water...	Tank.....	L.H.	Cir-spl....	Elec.....	1275	Bat.....
Holt..... D	110	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/2 x 3	2.50	4	Water...	Tank.....	L.H.	Cir-spl....	Elec.....	1275	Mag.....
Hoosierlite.....	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-4 1/2 x 5	8.10	4	Water...	Tank.....	"L" H.	Splash....	Cent.....	700	Mag.....
Independent.....	32	Gear.....	Yes.....	No.....	Unit.....	Own.....	1-3 1/4 x 4	5.62	4	Water...	Tank.....	"L" H.	Cir-spl....	Cent.....	750	Bat.....
Ker-O-El..... A&B	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-2 1/4 x 3 1/4	4.01	4	Water...	Tank.....	L.H.	Splash....	U. U. R. B.	1500	Bat.....
Kero Electric.....	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 3 1/4	4.25	4	Water...	Radiator...	"L" H.	Cir-spl....	Elec.....	1150	Mag.....
Kewanee.....	32-110	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 4	4.25	4	Water...	Tank.....	S.Slec.	Cir-spl....	Cent.....	.....	Bat.....
Kohler..... B	110	Direct.	Yes.....	Yes.....	Unit.....	Own.....	4-2 x 3	6.40	4	Water...	Radiator...	L.H.	Cir-spl....	Cent.....	1000	Mag.....
Lalley-Light..... K	32	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/2 x 2	2.50	2	Water...	Tank.....	2 Port.	Splash....	Cent.....	1800	Bat.....
Lalley-Light..... HU	32	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/2 x 2	2.78	2	Water...	Tank.....	2 Port.	Splash....	Cent.....	1800	Bat.....
Langstad..... 2-C-6	110	Direct.	No.....	No.....	Unit.....	LeRoi.....	4-2 1/2 x 4 1/2	15.63	4	Water...	Radiator...	"L" H.	Cir-spl....	Cent.....	1100	Mag.....
Langstad..... 2-B-1 1/2	32	Direct.	No.....	No.....	Unit.....	Own.....	1-3 1/4 x 4 1/2	3.91	4	Water...	Radiator...	"L" H.	Cir-spl....	Cent.....	1300	Bat.....
Lincoln Light..... 22	32-40	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 x 3	3.60	2	Water...	Radiator...	2 Port.	Splash....	Elec.....	1200	Bat.....
Main Power Light.....	32	Belt.....	No.....	No.....	Separate.....	Own.....	1-3 1/4 x 5	4.90	4	Water...	Hopper.....	L.H.	Splash....	Elec.....	500	Mag.....
Main Power Light.....	32	Belt.....	No.....	No.....	Separate.....	Own.....	1-3 1/4 x 5	4.90	4	Water...	Hopper.....	L.H.	Splash....	Cent.....	450	Mag.....
Main Power Light.....	110	Belt.....	No.....	No.....	Separate.....	Own.....	1-	7.00	4	Water...	Hopper.....	L.H.	Splash....	Elec.....	.....	Mag.....
Marco.....	32	Chain.....	No.....	No.....	Separate.....	New Way.....	4-4 1/2 x 4 1/2	32.40	4	Air.....	Hopper.....	L.H.	Splash....	Cent.....	800	Mag.....
National.....	32	Chain.....	.....	Yes.....	Unit.....	New Way.....	1-	5.00	4	Air.....	.....	L.H.	Splash....	Cent.....	750	Mag.....
Perfection..... SA	32-110	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 3 1/4	4.22	4	Water...	Radiator...	"L" H.	Splash....	Elec.....	1150	Bat.....
Phelps..... T	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 x 4	3.00	4	Water...	Tank.....	"L" H.	Cir-spl....	Cent.....	1200	Bat.....
Phelps..... D	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 x 4	3.00	4	Water...	Tank.....	"L" H.	Cir-spl....	Cent.....	1335	Bat.....
Radiant..... 9	32	Direct.	No.....	No.....	Unit.....	Own.....	1-3 x 3	3.60	4	Water...	Radiator...	.....	Splash....	Elec.....	1250	Bat.....
Reeco.....	32	Direct.	No.....	No.....	Unit.....	Own.....	1-4 x 5	6.40	4	Water...	Hopper.....	L.H.	Splash....	Cent.....	475	Mag.....
Regalite.....	32	Direct.	No.....	No.....	Unit.....	Own.....	1-3 1/4 x 3 1/2	4.22	4	Air.....	.....	L.H.	Cir-spl....	.....	.....	Bat.....
Simms..... B1	12	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/2 x 2	1.79	2	Air.....	.....	2 Port.	Splash....	Elec.....	1600	Mag.....
Simms..... B1	32	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/2 x 2	1.79	2	Air.....	.....	2 Port.	Splash....	Elec.....	.....	Mag.....
Simms..... B1	110	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/2 x 2	1.79	2	Air.....	.....	2 Port.	Splash....	Elec.....	.....	Mag.....
Stearns..... H	32	Direct.	Yes.....	Yes.....	Unit.....	Own.....	1-3 x 3	3.60	4	Water...	Tank.....	L.H.	Cir-spl....	Elec.....	1150	Mag.....
Stearns.....	32	Direct.	No.....	No.....	Unit.....	Own.....	1-2 1/2 x 3	2.76	4	Water...	Tank.....	L.H.	Cir-spl....	Elec.....	1250	Mag.....
Stearns.....	32	Direct.	Yes.....	Yes.....	Unit.....	Own.....	1-2 1/2 x 3	2.76	4	Water...	Tank.....	L.H.	Cir-spl....	Elec.....	1250	Mag.....
Sturtevant.....	110-250	Direct.	No.....	No.....	Unit.....	Own.....	4-3 1/4 x 5	16.90	4	Water...	Tank.....	"L" H.	Hol-erk.....	Cent.....	900	Mag.....
Sturtevant.....	110-250	Direct.	No.....	No.....	Unit.....	Own.....	4-4 x 6	25.60	4	Water...	Tank.....	T.H.	Hol-erk.....	Cent.....	750	Mag.....
Sturtevant.....	110-250	Direct.	No.....	No.....	Unit.....	Own.....	6-4 x 6	38.40	4	Water...	Tank.....	T.H.	Hol-erk.....	Cent.....	750	Mag.....
Sunbeam..... C	32	Direct.	Yes.....	Yes.....	Unit.....	Own.....	1-2 1/2 x 3	2.00	4	Water...	Tank.....	"L" H.	Splash....	Elec.....	1750	Bat.....
Swanlite..... B	32-40	Direct.	Yes.....	Yes.....	Unit.....	Own.....	1-3 x 4	3.60	4	Water...	Tank.....	"L" H.	Splash....	U. U. R. B.	1200	Bat.....
Upco Light.....	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-2 1/2 x 3 1/2	2.76	4	Water...	Tank.....	"L" H.	Splash....	Cent.....	.....	Bat.....
Upco Light.....	32-110	Direct.	No.....	No.....	Unit.....	LeRoi.....	2-3 1/4 x 4 1/2	7.81	4	Water...	Radiator...	"L" H.	Cir-spl....	Cent.....	.....	Mag.....
Upco Light.....	82-110	Direct.	No.....	Yes.....	Unit.....	Own.....	2-3 1/4 x 4 1/2	7.81	4	Water...	Radiator...	"L" H.	Cir-spl....	Cent.....	1000	Mag.....
Western Elec..... B-90	32	Direct.	No.....	Yes.....	Unit.....	Own.....	1-3 1/4 x 4 1/2	4.90	4	Air.....	Gener.....	L.H.	Cir-spl....	Cent.....	1000	Bat.....
Western Elec..... 90	32	Belt.....	No.....	No.....	Separate.....	Inter.....	1-4 1/2 x 5 1/2	3.91	4	Water...	Hopper.....	L.H.	Hol-erk.....	Cent.....	600	Mag.....
Western Elec..... 30-D	110	Belt.....	No.....	No.....	Separate.....	Full & J.....	1-	7.00	4	Water...	Hopper.....	L.H.	M.f.m.o.....	Cent.....	400	Mag.....
Western Elec..... 30-C	110	Belt.....	No.....	No.....	Separate.....	Full & J.....	1-	7.00	4	Water...	Hopper.....	L.H.	M.f.m.o.....	Cent.....	400	Mag.....
Willys-Light.....	32	Direct.	No.....	Yes.....	Unit.....	Auto-Lite.....	1-2 1/2 x 2 1/2	2.50	2	Air.....	.....	2 Port.	Splash....	.....	1700	Bat.....
Willys-Light.....	32	Direct.	No.....	Yes.....	Unit.....	Auto-Lite.....	1-2 1/2 x 3 1/2	3.31	4	Air.....	.....	S.Slec.	Splash....	.....	1250	Bat.....
Wisconsin..... 2&3	32	Belt.....	No.....	No.....	Separate.....	Own.....	4-4 1/2 x 5 1/2	32.40	4	Water...	Hopper.....	"L" H.	M.f.m.o.....	Cent.....	400	Bat.....
Wisconsin.....	32	Belt.....	No.....	No.....	Separate.....	Own.....	4-5 1/2 x 6 1/2	48.40	4	Water...	Hopper.....	"L" H.	M.f.m.o.....	Cent.....	380	Bat.....
Worthington.....	32	Direct.	No.....	No.....	Unit.....	Own.....	1-	.....	4	Water...	Radiator...	L.H.	M.f.m.o.....	Cent.....	550	Bat.....

ENGINE:

I. H.—In Head
 "L" H.—"L" Head
 "T" H.—"T" Head
 S. Slec.—Sliding Sleeve
 Rot. Slec.—Rotating Sleeve

Generator:

Inter—International
 Full & J.—Fuller and Johnson
 Cir. Spl.—Circulating Splash
 Hol. Crk.—Hollow Crankshaft

M. f. m. o.—Multi Feed Mechanical

Oiler
TYPE OF ENGINE
GOVERNOR:
 Cent.—Centrifugal
 Elec.—Electric

U. U. R. B.—Ungoverned Unit Regulated by battery

TYPE OF IGNITION:
 Mag.—Magnet
 Bat.—Battery

1923 Isolated Electric Plants

				GENERATOR								BATTERY									
CRANKSHAFT BEARINGS		FUEL SYSTEM		K.W. Rating at Normal Voltage	No. of Poles	Field Connections for Cranking	Field Connections for Generating	BEARINGS		RATING		Batteries of Line Voltage Used?	Low Voltage Cranking Battery Used?	Automatic Stopping Device	Power Pulley Provided?	Ampere Hour Meter Furnished?	MAKE AND MODEL				
Number	Type	Type	Recommended Fuel					Number	Type	8-Hour Basis	72-Hour Basis										
2	Plain & Ball	Pump	Gas	1	2	Comp	Comp	2	P.&L	134	191	Yes		A.H.M.	No	Yes	Alamo	Silent			
2	Plain		Gas	1	2	Comp	Comp	2	Plain	Opt	Opt	Yes	No	P.Q.F.	Yes	No	Cushman	15			
2	Roller	Suc.L.	Ker	1 1/2	2	Comp	Shunt	1	Ball	120		Yes	No	P.Q.F.	Yes	No	C-Y-C				
2	Ball & roller	Suc.L.	G-N.G.	1 1/4	4	Comp	Shunt				160	Yes		P.Q.F.	No	No	Delco-Light	1266			
2	Ball & roller	Pump	G-N.G.	3	6	Comp	Shunt	None			160	Yes	No	P.Q.F.	No	No	Delco-Light	346			
2	Ball & roller	Pump	G-N.G.	3	6	Comp	Shunt	None			160	Yes	No	P.Q.F.	No	No	Delco-Light	316			
2	Ball & roller	Pump	G-N.G.	2 1/4	6	Comp	Shunt	None			160	Yes	No	P.Q.F.	Opt	No	Delco-Light	320			
2	Ball & roller	Suc.L.	G-N.G.	2 1/4	4	Comp	Shunt	None			160	Yes	No	P.Q.F.	No	No	Delco-Light	866			
2	Ball & roller	Pump	G-N.G.	2 1/4	6	Comp	Shunt	None			320	Yes	No	P.Q.F.	Opt	No	Delco-Light	366			
2	Ball & roller	Suc.L.	G-N.G.	1 1/4	4	Comp	Shunt	None			80	Yes	No	P.Q.F.	No	No	Delco-Light	1295-1296			
2	Ball & roller	Pump	G-N.G.	1 1/4	4	Comp	Shunt	None			160	Yes	No	P.Q.F.	Yes	No	Delco-Light	1286			
2	Plain & ball	Suc.L.	G-N.G.	1 1/2	4	Shunt	Shunt	None			80	Yes	No	P.Q.F.	No	No	Delco-Light	620			
2	Ball	Pump	Gas	1	2	Comp	Comp	2	Ball	80		Yes	No	A.H.M.	Opt	Yes	Electrim				
2	Ball	Suc.L.	GorK.	1 1/4	2	Comp	Shunt	1	Plain	Opt	Opt	Yes	No	Vol.R.	Yes	No	Everlite	A			
2	Plain	Suc.L.	GorK.	1 1/2	2	Comp	Shunt	2	Ball	60		Yes	No		Yes	No	Fairbanks-Morse	1 1/2			
2	Plain	Suc.L.	GorK.	1 1/2	4	Comp	Shunt	2	Ball	160		Yes	No		Yes	No	Fairbanks-Morse	J			
2	Plain	Suc.L.	GorK.	1	2	Comp	Shunt	2	Ball	80-136	100-167	Yes	No	A.H.M.	Yes	Yes	Genco	A&B			
2	Plain	Suc.L.	GorK.	3	4	Comp	Shunt	2	Plain	80-136	100-167	Yes	No	A.H.M.	Yes	Yes	Genco	C&D			
2	Plain	Grav	Gas	1 1/4	4	Comp	Shunt	2	Plain	Opt	Opt	Yes	No		Yes	Yes	Globe				
2	Plain	Grav	Gas	5	4	Comp	Comp	1	Plain	Opt	Opt	Yes	No		No	No	Globe				
2	Plain	Grav	Gas	1 1/4	4	Comp	Shunt	2	Plain	40	45	No	Yes		Yes	No	Holt	C			
2	Plain	Grav	Gas	3 1/2	4	Comp	Shunt	2	Plain			Yes	No		Yes	No	Holt	D			
2	Roller	Pump	Gas	1 1/2	4	Shunt	Shunt	1	Roller	180	240	No	No	A.H.M.	Yes	Yes	Hoosierite	D			
2	Ball	Suc.L.	GorK.	1 1/2	4	Comp	Comp	2	Ball	163	236	Yes	No	P.Q.F.	Yes	Yes	Independent				
1	Plain	Suc.L.	GorK.	1	4	Comp	Shunt	1	Plain		80-160	Yes	No	Vol.R.	No	Opt	Ker-O-EI	A&B			
3	Plain & ball	Suc.L.	GorK.	1	2	Shunt	Shunt	3	P.&B.			Yes	Yes		Yes	Opt	Kero Electric				
2	Ball	Vac.	Gas	1 1/2	4	Comp	Shunt	2	Ball	Opt		Yes	No	P.Q.F.	Yes	Opt	Kewanee				
3	Plain & ball	Vac.	G-N.G.	1 1/2	4	Shunt	Comp	1	Ball			Yes	Yes	P.Q.F.	No	No	Kohler	B			
2	Ball	Grav	Gas	1	2	Shunt	C.&S.	1	Plain	80	112	Yes	No	P.Q.F.	No	No	Lalley-Light	K			
2	Ball	Pump	Gas	1 1/4	2	Shunt	C.&S.	2	Ball	80	112	Yes	No	P.Q.F.	No	No	La ley-Light	HU			
2	Plain	Vac.	GorK.	6	4	Comp	Comp	1	Plain	88-210	95-305	Yes	No		No	Opt	Langstadt	2-C-6			
2	Plain	Suc.L.	GorK.	1 1/4	4	Comp	Shunt	1	Plain	88-150	128-218	Yes	No		Yes	Opt	Langstadt	2-B-1 1/2			
2	Ball	Suc.L.	Gas	1 1/4	4	Shunt	Shunt		Plain	130	205	Yes	No	P.Q.F.	Yes	No	Lincoln Light	22			
2	Plain	Suc.L.	G-N.G.	1 1/2	2	S.&C.	Shunt	2	Plain	60	84	No	Yes		Yes	Yes	Main Power Light				
2	Plain	Suc.L.	G-N.G.	1	2	Comp	Shunt	2	Plain	60	84	No	No		Yes	Yes	Main Power Light				
2	Plain	Suc.L.	G-N.G.	3	4	Comp	Shunt	2	Plain	90	120	No	No		Yes	Yes	Main Power Light				
2	Plain	Grav	G-N.G.	1 1/2	4	Shunt	Shunt	2	Ball	112-225		Yes	No	A.H.M.	Yes	No	Marco				
2	Plain	Grav	GorK.	1 1/2	4	Comp	Shunt	2	Ball	160	235	Yes	No	A.H.M.	Yes	Yes	National				
2	Plain	Suc.L.	GorK.	1 1/4		Comp	Shunt	2	Ball			Yes	No	V.&C.R.	Yes	No	Perfection	SA			
2	Ball	Suc.L.	G-N.G.	1	4	Comp	C.&S.	1	Ball	Opt	Opt	Yes	No	Vol.R.	No	No	Phelps	T			
2	Ball	Suc.L.	G-N.G.	1 1/2	4	Comp	C.&S.	2	Ball	Opt	Opt	Yes	No	Vol.R.	Yes	No	Phelps	D			
2	Plain	Vac.	Gas	1 1/4	4	Shunt	Shunt	1	Plain	120	168	No	No	P.Q.F.	Yes	No	Radiant	9			
2	Plain	Suc.L.	Ker	1 1/4	4	Shunt	Shunt	2	Plain	Opt	Opt	Yes	Yes		Yes	No	Reco				
2	Plain	Suc.L.	GorK.	3/4	4	Shunt	Shunt	None			80	Yes	Yes		Opt	No	Regalite				
1	Ball	Pump	Gas	1 1/2	6	Shunt	Shunt	1	Ball	160	230	Yes	No	P.Q.F.	Yes	No	Simms	B1			
1	Ball	Pump	Gas	1 1/2	6	Shunt	Shunt	1	Ball	70	100	Yes	No	P.Q.F.	Yes	No	Simms	B1			
1	Ball	Pump	Gas	1 1/2	6	Shunt	Shunt	1	Ball	None	None	Yes	No	P.Q.F.	Yes	No	Simms	B1			
2	Ball	Grav	GorK.	1 1/2	4	Comp	Shunt	1	Ball	Opt	Opt	Yes	Yes	A.H.M.	Yes	Yes	Stearns	H			
2	Plain	Grav	GorK.	3 1/2	2	None	Shunt	1	Plain	None	None	No	No	V.&C.R.	No	No	Stearns				
2	Ball	Grav	GorK.	3 1/2	2	Comp	Shunt	1	Plain	90-150	110-180	Yes	No	A.H.M.	Yes	Yes	Stearns				
2	Plain	Pump	G-N.G.	5	6		Comp	1	Plain	Opt	Opt	Yes	No		Opt	No	Sturtevant				
3	Plain	Pump	G-N.G.	10	6		Comp	1	Plain	Opt	Opt	Yes	No		Opt	No	Sturtevant				
4	Plain	Pump	G-N.G.	15	6		Comp	1	Plain			Yes	No		Opt	No	Sturtevant				
2	Ball	Pump	Gas	3/4	4	Comp	Shunt		Plain	44	75	Yes	No	V.&C.R.	Yes	No	Sunbeam	C			
2	Plain	Suc.L.	GorK.	1 1/4	4	Comp	Shunt	2	Plain	Opt	Opt	Yes	No	Vol.R.	Yes	No	Swanlite	B			
1	Plain	Grav	Gas	1	4	Shunt	Shunt	1	Ball	120	165	Yes	No	None	Opt	No	Upro Light				
2	Plain	Vac.	Gas	2 1/2	4	Comp	Comp	1	Ball	120	165	Yes	No		Yes	No	Upro Light				
2	Plain	Vac.	Gas	3 1/2	4	Comp	Comp	1	Ball	120	165	Yes	No	P.Q.F.	Yes	No	Upro Light				
1	Plain	Pump	GorK.	2 1/4	4	Comp	Shunt	1	Plain	90		Yes	No	Curr.R.	Yes	No	Western Elec.	B-90			
2	Plain	Pump	GorK.	3	4	Shunt	Shunt	2	Plain	90		Yes	No	None	Yes	No	Western Elec.	90			
2	Plain	Suc.L.	GorK.	3	4		Comp	2	Plain	None	None	Yes	No	None	Yes	No	Western Elec.	30-D			
2	Plain	Suc.L.	GorK.	3	4		Comp	2	Plain	90		Yes	No	None	Yes	No	Western Elec.	30-C			
2	Plain	Suc.L.	GorK.	1 1/2	4	Shunt	Shunt	2	Plain	160	80	Yes	No	P.Q.F.	No	No	Willys-Light				
2	Plain	Suc.L.	GorK.	1 1/4	4	Shunt	Shunt	2	Plain	160	225	Yes	No	A.H.M.	No	Yes	Willys-Light				
2	Plain	Grav	Gas	1 1/2		Shunt	Shunt	2	Plain	65-120	88-180	Yes	Yes	None	Yes	Opt	Wisconsin	243			
2	Plain	Grav	Gas	3 1/2		Shunt	Shunt	2	Plain	120-210		Yes	Yes	None	Yes	Opt	Wisconsin				
2	Plain	Pump	GorK.	1 1/4	4	Shunt	Shunt	2	Ball	120-150		Yes	No		Yes	No	Worthington				

FUEL SYSTEM:

Grav—Gravity
 Suc. L.—Suction Lift
 Vac—Vacuum Tank

FUEL RECOMMENDED:

Gas—Gasoline

Ker—Kerosene

G. or K.—Gasoline or Kerosene
 G-N. G.—Gas, Kerosene or Natural Gas

FIELD CONNECTIONS:

Comp—Compound
 C. & S.—Compound and Shunt

AUTOMATIC STOPPING

DEVICE:

A. H. M.—Ampere Hour Meter
 V. & C. R.—Voltage and Current Relay
 Curr. R.—Current Relay

Vol. R.—Voltage Relay

P. Q. F.—Predetermined Quantity of Fuel

BEARINGS:

P. & B.—Plain and Ball

Mechanical Specification

Specification Number	MAKE AND MODEL	RATING		FRONT ASSEMBLY					REAR ASSEMBLY					FRAME					ENGINE					
		In Tons	Passenger Capacity	Wheelbase (Ins.)	Chassis Weight (Lbs.)	Make	Model	Tread (Ins.)	Road Clearance (Ins.)	Tire Type and Size (Ins.)	Tire Type and Size (Ins.)	Road Clearance (Ins.)	Tread (Ins.)	Make	Model	Final Drive	Total Gear Reduction	Weight to Top of Frame at Dash (Ins.)	Type of Frame at Rear Axle	Outriggers Attached to Frame	Make	Make	Model	No. of Cylinders Bore and Stroke	Oiling System
1	Ace	30	1 1/2	30	144 4600	Timk.	1452	68	8	P-36x6	P-36x6d	67 1/2	74	Timk.	6560	W	5.40 23	Kickup.	Yes	Ow.	Mid.	412	4-3 1/2 x 5	FL Pr.
2	Ace	30	1 1/2	30	204 6000	Timk.	1550	68	8	P-36x6	P-36x6d	67 1/2	74	Timk.	6511-A	W	5.40 23	Kickup.	Yes	Ow.	Mid.	400	4-4 1/2 x 6	FL Pr.
3	Acme	20	1 1/2	30	129 3050	Timk.	1250	56	11	P-35x5	P-35x5	11 1/2	56	Timk.	6250	W	6.75 30	Straight.	No.	Smith.	Cont.	N	4-3 1/2 x 5	Sp. Pr.
4	Acme	30	1 1/2	30	129 3400	Timk.	1452	56	11	P-34x5	P-36x6	10 1/2	56	Timk.	6352	W	7.20 30	Straight.	No.	Smith.	Cont.	N	4-3 1/2 x 5	Sp. Pr.
5	Acme	40	2	30	141 3980	Timk.	1520	58	11 1/2	P-35x5	P-38x7	10 1/2	58	Timk.	6460	W	8.75 31	Straight.	No.	Smith.	Cont.	J4	4-3 1/2 x 5	FL Pr.
6	Acme	60	3	30	152 4830	Timk.	1540	58 1/2	12	S-36x4	S-36x7	10 1/2	58 1/2	Timk.	6460	W	9.25 32	Straight.	No.	Smith.	Cont.	K4	4-4 1/2 x 5 1/2	FL Pr.
7	Acme	60L	3	30	156 5050	Timk.	1540	58 1/2	12	P-36x6	P-40x8	10 1/2	58 1/2	Timk.	6460	W	6.00 32	Straight.	No.	Smith.	Cont.	LA	4-4 1/2 x 5 1/2	FL Pr.
8	Autocar	21UG	1 1/2	18	120 3700	Ow.	59 1/2	14	14	S-34x4	S-34x6	10 1/2	59 1/2	Ow.	D.R.	8.30 31 1/2	Straight.	No.	Parish.	Ow.	2-4 1/2 x 4 1/2	Splash		
9	Autocar	27K	2	25	138 5350	Ow.	60	12	12	S-34x5	S-36x7	11 1/2	60	Ow.	D.R.	7.72 30	Straight.	No.	Parish.	Ow.	4-4 x 5 1/2	Splash		
10	Autocar	26B	4	32	156 7400	Ow.	63	13 1/2	13 1/2	S-34x6	S-36x12	10 1/2	65	Ow.	D.R.	8.72 34	Straight.	No.	Parish.	Ow.	4-4 1/2 x 5 1/2	Splash		
11	Beck	A39	1 1/2	15	132 2800	Shu.	320	56	11	P-34x4 1/2	P-34x4 1/2	12 1/2	56	Iron M	W	6.50 30	Straight.	Yes	Parish.	H-S.	7000	4-3 1/2 x 5	Sp. Pr.	
12	Bessemer	G	1	16	124 3000	Shu.	350	56	11 1/2	P-35x5	P-35x5	12 1/2	56	Torb.	A.	I.G.	6.28 30 1/2	Straight.	No.	Parish.	Cont.	N	4-3 1/2 x 5	Sp. Pr.
13	Brockway	E2	1	13	135 3250	Colu.	5045	56	10 1/2	P-33x5	P-33x5	10 1/2	56	Colu.	52001	S.B.	5.12 27	Straight.	No.	Ow.	Wisc.	S.U.	4-4 x 5	Press
14	Buick	23-4-SD	3 1/2	109	109	Ow.	56	11	11	P-31x4	P-31x4	11 1/2	56	Ow.	S.B.	4.66	Straight.	No.	Ow.	Ow.	Ow.	4-3 1/2 x 4 1/2	Sp. Pr.	
14A	Chevrolet	T	1	125	2840	Ow.	198	11	11	P-33x4	P-35x5	11 1/2	56	Ow.	W	7.00	Straight.	No.	Ow.	Ow.	Ow.	6T	4-3 1/2 x 5 1/2	Sp. Pr.
14B	Commerce		1	198	198	Timk.	11	11	11	P-36x6	P-36x6d	11 1/2	56	Timk.	W	6.30 31 1/2	Straight.	No.	Ow.	Ow.	Ow.	6T	4-3 1/2 x 5 1/2	Press
15	Day Elder	C25	2 1/2	25	150 4600	Sheld.	D-343	56	10 1/2	P-32x6	P-38x9	11 1/2	58 1/2	Sheld.	W-21	W	6.80 29	Straight.	No.	Savage.	Buda.	HTU	4-4 1/2 x 5 1/2	FL Pr.
16	Day Elder	D20	2	20	144 3950	Colu.	7018	56	10 1/2	P-35x5	P-38x7	11 1/2	58	Sheld.	W-103	W	6.00 29	Straight.	No.	Savage.	Cont.	C-2	4-4 1/2 x 5 1/2	Sp. Pr.
17	Defiance	G	1	19	128	Colu.	56	56	56	P-32x6	P-34x7	11 1/2	58	Eaton	1000	S.B.	6.14	Straight.	Yes	Detr.	Cont.	N	4-3 1/2 x 5	Sp. Pr.
18	Dependable	CD	1 1/2	151	4350	Shu.	350	56	9	34x4	C-34x6	11 1/2	57	Wisc.	800J	W	8.00 30	Straight.	No.	Parish.	Buda.	CTU	4-3 1/2 x 5 1/2	FL Pr.
19	Dependable	EG	2 1/2	167	5900	Shu.	550	56	10	C-36x4	C-36x8	11 1/2	59	Wisc.	900C	W	9.25 32	Straight.	No.	Parish.	Buda.	HTU	4-4 1/2 x 5 1/2	FL Pr.
20	Duplex	A	2	165	3900	Sheld.	FA500	56	12 1/2	P-35x5	P-38x7	11 1/2	62	Sheld.	W103	W	6.50 31 1/2	Straight.	Yes	Parish.	Hink.	HAA400	4-4 x 5 1/2	FL Pr.
21	Duplex	AB	23	160	4400	Sheld.	D343	56	12 1/2	P-35x5	P-38x7	11 1/2	62	Sheld.	W103	W	6.50 31 1/2	Straight.	Yes	Parish.	Hink.	HAA400	4-4 x 5 1/2	FL Pr.
22	Eagle	100	2	130	4100	Colu.	7000	56	11 1/2	S-34x4	S-34x7	11 1/2	60	Rus.	600-1	I.G.	8.80	Straight.	No.	Ow.	Buda.	CTU	4-3 1/2 x 5 1/2	FL Pr.
23	Eugol	752	1	135	3500	Timk.	1250	56	11 1/2	P-34x5	P-34x5	11 1/2	60	Timk.	6250	W	6.50 31 1/2	Straight.	No.	Parish.	Buda.	WTU	4-3 1/2 x 5 1/2	FL Pr.
24	Fageol		27	218	9600	Timk.	1520	70	7 1/2	P-36x6	P-36x6	7 1/2	70	Timk.	6511	W	6.10 19 1/2	Kickup.	Yes	Ow.	Hall-S.	50	4-4 1/2 x 5 1/2	Press
25	Fageol		12	218	7800	Timk.	1520	70	7 1/2	P-36x6	P-36x6	7 1/2	70	Timk.	6511	W	5.20 19 1/2	Kickup.	Yes	Ow.	Hall-S.	50	4-4 1/2 x 5 1/2	Press
26	Fifth Avenue Coach	"J"	29	172	4895	Timk.	Special	68 1/2	7 1/2	P-36x6	P-36x6	6 1/2	73 1/2	Timk.	Special	W	6.80 30 1/2	Kickup.	No.	Parish.	R.&V.K.	4-4 x 6	Press	
27	Fifth Avenue Coach	"A"	51	156	6066	Ow.	66 1/2	7 1/2	7 1/2	S-36x4	S-36x5	6 1/2	73 1/2	Ow.	W	6.80 30 1/2	Straight.	No.	Ow.	R.&V.K.	4-4 x 6	Press		
28	Fifth Avenue Coach	"L"	51	173	3350	Ow.	67	7 1/2	7 1/2	S-36x5	S-36x5	6 1/2	73 1/2	Ow.	I.G.	6.50 18 1/2	Kickup.	Parish.	R.&V.K.	4-4 x 6	Press			
29	Ford	TT	1	123	1440	Ow.	56	11 1/2	11 1/2	P-30x3 1/2	P-32x4 1/2	9 1/2	66	Ow.	W	Opt. 25	Straight.	No.	Parish.	Ow.	Ow.	4x3 1/4	Splash	
30	Garford	51	29	192	192	Timk.	68	56	56	S-36x	S-36x8	5 1/2	74	Timk.	W	25 1/2	Kickup.	Yes	Parish.	Buda.	HTU	4-4 1/2 x 5 1/2	FL Pr.	
30A	Gary	FB	21	154	3680	Timk.	1452	56	56	P-35x5	P-36x6	5 1/2	74	Timk.	6352	W	6.20	Straight.	No.	Parish.	Buda.	GBU	4-4 x 5 1/2	Press
30B	Gary	BIL	25	174	4450	Timk.	1520	58	56	P-35x5	P-38x7	5 1/2	74	Timk.	6460	W	6.00	Straight.	No.	Parish.	Buda.	EBU	4-4 1/2 x 5 1/2	Press
31	G.W.W.		1 1/2	142	3200	Shu.	56	56	56	P-35x5	P-35x5	12 1/2	56	Clark	I.D.	I.G.	7.00 31	Straight.	No.	Ow.	Weid.	MA	4-3 1/2 x 5 1/2	Press
32	GMC	K-20	20	178	4030	Ow.	55 1/2	11 1/2	11 1/2	P-36x6	P-36x6	9 1/2	53 1/2	Ow.	S.B.	6.00 30	Straight.	No.	Smith.	Ow.	Ow.	4-4 x 5 1/2	FL Pr.	
33	Guider		30	196	6500	Shu.	610B	64	8	C-36x5	C-36x8	9 1/2	71	Clark	2D	I.G.	7.00 25 1/2	Kickup.	Yes	Parish.	Buda.	EBU	4-4 1/2 x 5 1/2	Sp. Pr.
34	Harvey	WOA	2	25	160 5400	Sheld.	D343	56	10	S-34x4	S-34x7	9 1/2	59 1/2	Sheld.	W103	W	7.75 33	Straight.	No.	Ow.	Buda.	ETU	4-4 1/2 x 5 1/2	Press
35	Harvey	WFB	2 1/2	35	160 5900	Sheld.	D370	56	11 1/2	S-36x4	S-36x7	9 1/2	58	Sheld.	W21	W	7.75 34	Straight.	No.	Ow.	Buda.	ETU	4-4 1/2 x 5 1/2	Press
36	Harvey	WHB	3 1/2	45	160 7600	Sheld.	FA20	64	10 1/2	S-36x5	S-36x5	9 1/2	69 1/2	Sheld.	W31	W	8.75	Straight.	No.	Ow.	Buda.	YTU	4-4 1/2 x 6	Press
37	International	61	3	164	4800	Ow.	61	56	56	S-36x4	S-36x7d	61 1/2	Ow.	Ow.	I.G.	4.85	Straight.	No.	Ow.	Ow.	Ow.	4-4 1/2 x 5	Sp. Pr.	
37A	Jumbo		27	200	5300	Ow.	74	7	7	S-36x	S-36x	10 1/2	74	Clark	3D	I.G.	26	Kickup.	No.	Buda.	FBU	4-4 1/2 x 5 1/2	FL Pr.	
38	K-Z		3 1/2	125	125	Timk.	1250	56	56	P-33x5	P-33x5	56	Timk.	5311	S.B.	4.90	Straight.	No.	Ow.	Cont.	N	4-3 1/2 x 5	Sp. Pr.	
39	Kelly-Springfield	K-340	1 1/2	144	4670	Ow.	57	56	56	P-36x3 1/2	S-36x6	60	Ow.	Ow.	W	8.50	Straight.	No.	Smith.	Ow.	Ow.	4-3 1/2 x 5 1/2	Press	
40	Kelly-Springfield	K-38	2 1/2	150	5200	Ow.	60	60	60	S-36x4	S-36x4d	62 1/2	Ow.	Ow.	W	11.66	Straight.	No.	Smith.	Ow.	Ow.	4-3 1/2 x 5 1/2	Press	
41	Kelly-Springfield	K-35	2 1/2	144	5000	Ow.	60	60	60	S-36x4	S-36x4d	65	Ow.	Ow.	Ch.	12.00	Straight.	No.	Smith.	Ow.	Ow.	4-3 1/2 x 5 1/2	Press	
42	Kelly-Springfield	K-42	3 1/2	156	8500	Ow.	70	70	70	S-36x5	S-40x5d	68 1/2	Stand	607-5	W	10.25	Straight.	No.	Rals.	Ow.	Ow.	4-4 1/2 x 6 1/2	Press	
43	Kelly-Springfield	K-40	3 1/2	150	7730	Ow.	70	70	70	S-36x5	S-40x5d	73 1/2	Ow.	Ch.	10.48	Straight.	No.	Smith.	Ow.	Ow.	Ow.	4-4 1/2 x 6 1/2</		

ns of 1923 Motor Busses

ENGINE			ELECTRICAL SYSTEM							CLUTCH				GEARSET				SPRINGS		BRAKES		STEERING GEAR		Wheels Make	Specialty Number	
Fuel System	Governor	Max. Governed Speed in M. P. H. of Bus.	Ignition System		Generator		Starter		Voltage	Make	Model	Type	Make	Model	Location	No. of Forward Speeds	Universal Make	Front Length (Ins.)	Rear Length (Ins.)	Foot Type and Location	Hand Type and Location	Make	Model			
Carburetor Make	Model		Make	Model	Make	Model	Make	Model																		
Zenith	U5	Pierce	30	A-K	CC	West*	West*	6-8	B-L	35	M.D.D.	B-L	35	Univ.	4	Univ.	40	60	I-Rw.	I-Rw.	Ross	BL	St.M.	1		
Zenith	U5	Victor	30	Eisem	G4	Remy	971A	910	6-8	B-L	55	M.D.D.	B-L	55	Univ.	3	Univ.	40	60	E-Dr.	I-Rw.	Ross	BL	Dayton	2	
Ray	M2	Duplex	23	Eisem	G4	Bosch*	1216	910	6-8	B.B.	DX	S.P.	Cot.	AAU	Univ.	3	Blood	38	52	I-Rw.	I-Rw.	Ross	XB	Bimel	3	
Ray	M2	Duplex	23	Eisem	G4	Bosch*	1216	910	6-8	B.B.	DX	S.P.	Cot.	AAU	Univ.	3	Blood	38	52	I-Rw.	I-Rw.	Ross	XB	Bimel	4	
Zenith	O4	Duplex	18	Eisem	G4	Delco*	197	200	6-8	B.B.	DX	S.P.	Cot.	AAU	Univ.	3	Blood	38	52	I-Rw.	I-Rw.	Ross	BL	Bimel	5	
Ray	G3P	Duplex	17	Eisem	G4	Delco*	197	200	6-8	B.B.	GX	S.P.	Cot.	RU	Univ.	4	Blood	40	52	I-Rw.	I-Rw.	Ross	BL	Bimel	6	
Ray	G3P	Duplex	18	Eisem	G4	Delco*	192	200	6-8	B.B.	RGX	S.P.	Cot.	RU	Univ.	4	Blood	40	52	I-Rw.	I-Rw.	Ross	BL	Bimel	7	
Strom	M2	Pharo	20	Bosch	DU4-2	L-N*	16G	L-N*	6-8	Own	S.P.	Own	S.U.	S.U.	3	Spicer	40	45	E-Rw.	I-Rw.	Ross	BL	Hoopes	8		
Strom	M2	Pharo	20	Bosch	DU4	L-N*	16G	L-N*	6-8	Own	S.P.	Own	S.U.	S.U.	3	Spicer	41	52	I-Rw.	I-Rw.	Ross	BL	Hoopes	9		
Strom	M2	Pharo	18	Bosch	DU4	L-N*	16G	L-N*	6-8	Own	S.P.	Own	S.U.	S.U.	3	Spicer	41	52	I-Rw.	I-Rw.	Ross	BL	Hoopes	10		
Strom	A1	Pharo	20	Bosch	DU4	L-N*	16G	L-N*	6-8	Own	S.P.	Own	S.U.	S.U.	3	Spicer	41	52	I-Rw.	I-Rw.	Ross	BL	Hoopes	11		
Strom	M1	Pharo	20	Bosch	DU4	L-N*	16G	L-N*	6-8	Own	S.P.	Own	S.U.	S.U.	3	Spicer	41	52	I-Rw.	I-Rw.	Ross	BL	Hoopes	12		
Zenith	U5	Victor	30	Eisem	G4	Remy	971A	910	6-8	B-L	55	M.D.D.	B-L	55	Univ.	3	Univ.	40	60	E-Dr.	I-Rw.	Ross	BL	Dayton	13	
Marvel	K	Pharo	18	Delco	23-35	Delco	23-35	Delco	6-8	Own	M.D.D.	Own	Univ.	Univ.	3	Own	36	55	I-Rw.	E-Rw	Jacox	23-35	Own	14		
Zenith	Q4C	Mon	25	Remy	366M	AL	GH	AL	ME	6-8	Own	Cone	Mun.	Univ.	3	Own	37	53	I-Rw.	I-Rw.	Own	Own	Hayes	15A		
Zenith	Q5C	Mon	15	Eisem	G4	Bosch*	1015	West*	711	6-8	Cov	RU	M.D.D.	Cov	RU	Univ.	4	Hart	42	56	I-Rw.	I-Rw.	Gemm	T	Jones	16
Zenith	Q5C	Mon	16	Eisem	G4	Eisem*	M4 G6	West*	711	6-8	Cov	RU	M.D.D.	Cov	RU	Univ.	4	Hart	40	54	I-Rw.	I-Rw.	Gemm	K	Jones	17
Strom	O8L	Mon	30	Eisem	G4	Bosch*	1015	West*	711	6-8	Cov	RU	M.D.D.	Cov	RU	Univ.	4	Hart	40	54	I-Rw.	I-Rw.	Gemm	K	Jones	18
Zenith	O4Z	Mon	18	Split	A48	A-L*	A-L*	A-L*	711	6-8	Fuller	D	M.D.D.	Full	LTN3	S.U.	4	Arvac	40	50	I-Rw.	I-Rw.	Ross	BU	Bimel	19
Zenith	O5Z	Mon	14	Split	A48	A-L*	A-L*	A-L*	711	6-8	Fuller	GCL	M.D.D.	Full	G7	S.U.	4	Arvac	42	52	I-Rw.	I-Rw.	Ross	BL	Bimel	20
Strom	M2	Pharo	20	West	SC	West	760	West	711	6-8	Covert	M.D.D.	Cov	RU3C	Univ.	3	Peters	38	48	I-Rw.	I-Rw.	Ross	BL	Motor	21	
Strom	M2	Pharo	18	West	SC	West	760	West	711	6-8	B-L	50	M.D.D.	B-L	50	Univ.	4	Peters	38	48	I-Rw.	I-Rw.	Ross	BL	Motor	22
Zenith	O4	Pharo	20	Eisem	GS	Bosch*	West*	West*	711	6-8	Covert	MUC	M.D.D.	Cov	MUC	Univ.	3	M.E.	38	48	E-Rw	I-Rw.	Lav	SI700	Stand	23
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	24	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	25	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	26	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	27	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	28	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	29	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	30	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	31	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	32	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	33	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	34	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	35	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	36	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	37	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	38	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	39	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	40	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	41	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	42	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	43	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	44	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	45	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	46	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	47	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	48	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	49	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	50	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	51	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	52	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	53	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	54	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	55	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.	I-Rw.	Ross	BL	Budd	56	
Zenith	L6	Hall-S	49	Delco	GA4	N-E*	Special	Special	12-16	Own	Special	S.P.	B-L	Special	S.U.	4	Snead	48	62	I-Rw.						

Mechanical Specifications of

Specification Numbs.	MAKE AND MODEL		RATING		Wheelbase (Ins.)	Chassis Weight (Lbs.)	FRONT ASSEMBLY				REAR ASSEMBLY				FRAME				ENGINE					
			In Tons	Passenger Capacity			Make	Model	Tread (Ins.)	Road Clearance (Ins.)	Tires Type and Size (Ins.)	Tires Type and Size (Ins.)	Road Clearance (Ins.)	Tread (Ins.)	Make	Model	Final Drive	Total Gear Reduction	Weight to Top of Frame at Dash (Ins.)	Type of Frame at Rear Axle	Outriggers Attached to Frame	Make	Make	Model	No. of Cylinders Bore and Stroke	Oiling System
64	Ranger	TK	1 1/2	136	3700	Timk.	1520	14	S-36x6	S-38x7	12	56	Timk.	6460	W	8.75	26	Straight	Yes	Hydr.	Wisc.	CAU.	4-3 1/2 x 5	Press.
65	Reo	F	1 1/2	128	2615	Own.	56	12 1/2	P-34x4 1/2	P-34x4 1/2	10	56	Own.	2D	S.B.	4.70	26	Straight	Yes	Own.	Own.	CAU.	4-4 1/2 x 4 1/2	Sp.Pr.
66	Republic		25	176	5750	Own.	66 1/2	10	C-34x4	C-34x4d	10	66	Clark	2D	LG	8.15		Straight	Yes	Detr.	Own.	CAU.	4-4 1/2 x 4 1/2	Sp.Pr.
67	Rock Falls	15	3 1/2	151		Timk.	1320	56	P-35x5	P-35x5	11	56	Timk.	5762	S.B.			Straight	No.	Parish	Cont.	6T.	6-3 3/8 x 5 1/2	Sp.Pr.
68	Rowe	CW	1 1/2	133	3820	Sheld.	FA500	56	P-36x6	P-36x6	11	56	Sheld.	W1501	W	6.50	34	Straight	No.	Own.	Wisc.	CAU.	4-3 3/4 x 5 1/2	Press.
69	Rowe	CDW	2 1/2	140	4500	Sheld.	D343	58	P-36x6	P-40x8	11	59 1/2	Sheld.	W103	W	7.75	34	Straight	No.	Own.	Wisc.	EAU.	4-4 x 5	Press.
70	Rowe	CDW	2 1/2	142	4800	Sheld.	D370	58	P-36x6	P-40x8	11	58	Sheld.	W21	W	7.75	34	Straight	No.	Own.	Wisc.	N.U.	4-4 1/2 x 5 1/2	Press.
71	Ruggles	20R	1	128	2800	Colu.	5000	56	P-34x5	P-34x5	10	56	Colu.	5100	S.B.	5.12		Straight	No.	Hydr.	Own.		4-4 x 5	Press.
72	Ruggles	40	2	148	4250	Colu.	7000	56	P-34x5	S-34x7	8 1/4	57 1/2	Wisc.	60	D.R.	7.00	31 1/2	Straight	No.	Hydr.	Own.		4-4 x 5	Press.
73	Sanford	15	1 1/2	132	3850	Sheld.	FA500	56	P-36x6	P-36x6	12	56	Sheld.	W1501	W	6.50	29 1/2	Straight	No.	Parish.	Cont.	N.	4-3 3/4 x 5	Sp.Pr.
73A	Selden	52	20	128	2720	Own.		56 1/2	C-36x4	C-36x6	9 1/2	56 1/2	Timk.	5311A	S.B.	6.13		Kickup	No.	Own.	Cont.	4	4-3 3/4 x 5 1/2	Fl.Pr.
73B	Service	12	3 1/2	150	4850	Timk.	1520	58	P-34x5	P-34x5	10 1/2	58	Timk.	6460	W			Straight	No.	Own.	Mid.	409	4-3 3/4 x 5 1/2	Press.
73C	Service	25	1 1/2	132	3300	Shu.	312	58	P-34x5	P-34x5	10 1/2	58	Timk.	1000	S.B.	5.62	28 1/2	Straight	No.	Own.	Buda.	WTU	4-3 3/4 x 5 1/2	Press.
73D	Service	32	2	150	4850	Timk.	1520	58	P-34x5	P-34x5	10 1/2	58	Timk.	6460	W			Straight	No.	Own.	Buda.	HU	4-4 1/2 x 5 1/2	Press.
73E	Service	52	3	160	5180	Timk.	1542B	58	S-36x4 1/2	P-34x4 1/2	10 1/2	58 1/2	Timk.	6560	W			Straight	No.	Own.	Buda.	HU	4-4 1/2 x 5 1/2	Press.
74	Standard	AK	28	190		Timk.	Special	68	P-36x6	P-36x10	6 1/2	72	Timk.	Special	W	7.00	30	Kicked	Yes	Cont.	Cont.	LA	4-4 1/2 x 5 1/2	Fl.Pr.
75	Stoughton	C	1 1/2	131	2480	Colu.	5000	56	P-34x4 1/2	P-34x4 1/2	10 1/2	56	Colu.	5200	S.B.	5.20	27 1/4	Straight	Yes	Smith	Mid.	410	4-3 3/4 x 5 1/2	Sp.Pr.
76	Stoughton	B	1 1/2	140	3730	Sheld.	FA500	55 1/2	P-34x5	P-34x5	11	57	Sheld.	W1501	W	6.50	30	Straight	No.	Smith	Wauk.	BUX	4-3 3/4 x 5 1/2	Sp.Pr.
77	Stoughton	D	2	140	4600	Sheld.	D343	56	P-36x6	P-40x8	7 1/2	59 1/2	Sheld.	W103	W	8.60	30	Straight	Yes	Smith	Here.	CUC	4-4 x 5 1/2	Fl.Pr.
78	Thomart	20	1 1/4	134	3600	Eaton	3070F	56	P-34x5	P-34x5	10	56 1/2	Eaton	1000	S.B.	5.12	28 1/2	Straight	No.	Hydr.	Hink.	400	4-4 x 5 1/2	Fl.Pr.
79	Ultimate	AJL	2	156	4600	Sheld.	D370	59 1/2	P-36x6	P-36x6d	8	60	Sheld.	W103	W	6.50	30	Straight	Yes	Parish	Buda	HTU	4-4 1/2 x 5 1/2	Press.
80	Ultimate	B	3	154	5360	Sheld.	D370	59 1/2	P-36x6	P-36x6d	8	60	Sheld.	W21	W	7.75	30	Straight	Yes	Parish	Buda	HTU	4-4 1/2 x 5 1/2	Fl.Pr.
81	United States	U	1 1/4	138	3400	Shu.	250	56	P-34x5	P-34x5	9 1/2	56	Clark	B.	S.B.	6.25	28	Straight	Yes	Own.	Buda	MU	4-3 3/4 x 5 1/2	Press.
82	United States	N	1 1/2	144	3850	Shu.	350	58	S-36x3 1/2	S-36x5	13	56	Clark	1D	LG	7.60	30	Straight	No.	Own.	Cont.	N	4-3 3/4 x 5	Sp.Pr.
83	Velie	46	1 1/2	133	3650	Colu.	7024	56	P-35x5	P-38x7		56	Torb.	C2	LG	8.10	31 1/4	Straight		Hydra.	Cont.	N	4-3 3/4 x 5	Sp.Pr.
84	White	15	3/4	133	3225	Own.		56	P-34x5	P-34x5	10 1/2	55 1/2	Own.		S.B.	5.36	29	Straight	Yes	Own	Own		4-3 3/4 x 5 1/2	Splash
85	White	50	25	198	5523	Own.		58 1/2	S-36x4	S-36x7	9 1/2	60 1/2	Own.		D.R.	6.83	27	Straight	Yes	Own	Own		4-4 1/2 x 5 1/2	Press
86	Witt-Will	N	1 1/2	144	4000	Timk.	1520	58	P-36x3 1/2	P-36x5		58	Timk.	6460	W	7.00	33	Straight	Yes	Parish.	Cont.	C4	4-4 1/2 x 5 1/2	Fl.Pr.
87	Yellow Cab	M22	3/4	117	2400	Timk.	1320	56	P-33x4 1/2	P-33x4 1/2	9 5/8	56	Timk.	6752	S.B.	4.90		Straight	Yes	Smith	Cont.	V4	4-3 3/4 x 5	Sp.Pr.

Mechanical Specifications of

MAKE AND MODEL	POWER PLANT																CLUTCH	
	Cylinder Arrangement	Cycle Type	Number of Cylinders, Bore and Stroke	Rated H.P. (N.A.C.C.)	Piston Displacement (Cu. Ins.)	Valve Arrangement	CARBURETER		LIGHTING SYSTEM		IGNITION SYSTEM		OILING SYSTEM					
							Make	Size (Ins.)	Stock or Optional	Type	Make	Type	Make	Type	Type of Lubricant			
Ace.....	Vert. . . .	4	4-2 3/4 x 3 1/4	10.5	77.2	O.E.S.I.	Schebler. . . .	1	Stock. . . .	Elec. . . .	Split. . . .	Mag. . . .	Simms. . . .	Splash. . . .	O.O. . . .	Oil D. . . .	F.P.&H.L.	
Cleveland .23ML & 23E	Vert. . . .	2	1-2 3/4 x 2 3/4	3.05	16.33	3 Port.	Own.		Opt.	Elec. . . .	Split. . . .	Mag. . . .	Bosch. . . .	Splash. . . .	OwG. . . .	Frie.	H.L.	
Excelsior.	1923 Vee. . .	4	2-3 1/4 x 3 1/4	9.49	61.00	O.I.S.E.	Schebler. . . .	1 1/8	Stock. . . .	Elec. . . .	Brng. . . .	Mag. . . .	Brng. . . .	Splash. . . .	O.O. . . .	Dry D. . . .	F.P.&G.H.B.	
Evans.	1923 Vert. .	2	1-2 x 1 3/4			2 Port.	Own.		Stock. . . .	Elec. . . .	Bosch. . . .	Mag. . . .	Bosch. . . .	Splash. . . .	OwG. . . .	None. . . .		
Harley-Davidson. .	JD Vee. . .	4	2-3 1/4 x 4	8.12	74.00	O.I.S.E.	Schebler. . . .	1 1/4	Stock. . . .	Elec. . . .	Own. . . .	Batt. . . .	Own. . . .	Splash. . . .	O.O. . . .	Dry D. . . .	F.P.&H.L.	
Harley-Davidson. .	FD Vee. . .	4	2-3 1/4 x 4	8.12	74.00	O.I.S.E.	Schebler. . . .	1 1/4	Opt.	Elec. . . .	Own. . . .	Mag. . . .	Bosch. . . .	Splash. . . .	O.O. . . .	Dry D. . . .	F.P.&H.L.	
Harley-Davidson. .	J Vee. . .	4	2-3 1/4 x 3 1/2	8.78	60.34	O.I.S.E.	Schebler. . . .	1	Opt.	Elec. . . .	Own. . . .	Batt. . . .	Own. . . .	Splash. . . .	O.O. . . .	Dry D. . . .	F.P.&H.L.	
Harley-Davidson. .	F Vee. . .	4	2-3 1/4 x 3 1/2	8.78	60.34	O.I.S.E.	Schebler. . . .	1	Opt.	Gas. . . .	Own. . . .	Mag. . . .	Bosch. . . .	Splash. . . .	O.O. . . .	Dry D. . . .	F.P.&H.L.	
Henderson.	1923 Vert. .	4	4-2 1/4 x 3 1/2	11.03	79.40	S by S. . . .	Zenith.	1	Stock. . . .	Elec. . . .	Split. . . .	Mag. . . .	Simms. . . .	Force. . . .	O.O. . . .	Oil D. . . .	F.P.&H.L.	
Indian.	Scout Vee. .	4	2-2 3/4 x 3 1/4	6.05	36.38	S by S. . . .	Schebler. . . .	3/4	Opt.	Elec. . . .	Split. . . .	Mag. . . .	Split. . . .	Splash. . . .	O.O. . . .	Oil D. . . .	Foot P.	
Indian.	Chief 61 Vee.	4	2-3 1/4 x 3 3/4	7.90	60.88	S by S. . . .	Schebler. . . .	1 1/4	Stock. . . .	Elec. . . .	Split. . . .	Mag. . . .	Split. . . .	Splash. . . .	O.O. . . .	Oil D. . . .	Foot P.	
Indian.	Chief 74 Vee.	4	2-3 1/4 x 4 1/4	8.90	73.60	S by S. . . .	Schebler. . . .	1 1/4	Stock. . . .	Elec. . . .	Split. . . .	Mag. . . .	Split. . . .	Splash. . . .	O.O. . . .	Oil D. . . .	Foot P.	
Indian.	Standard Vee.	4	2-3 1/4 x 3 3/4	7.90	60.80	S by S. . . .	Schebler. . . .	1 1/4	Opt.	Elec. . . .	Split. . . .	Mag. . . .	Split. . . .	Splash. . . .	O.O. . . .	Dry D. . . .	F.P.&H.L.	
Iver Johnson. . . .	16-7 Vee. .	4	2-3 1/4 x 3 3/4	8.90	64.40	S by S. . . .	Schebler. . . .	3/4	None. . . .			Mag. . . .	Bosch. . . .	Splash. . . .	O.O. . . .	Frie.	Hand L.	
Iver Johnson. . . .	16-4 Vee. .	4	1-3 1/4 x 3 3/4	4.25	33.60	S by S. . . .	Schebler. . . .	3/4	None. . . .			Mag. . . .	Bosch. . . .	Splash. . . .	O.O. . . .	Frie.	Hand L.	
Iver Johnson. . . .	V Vee. . .	4	1-3 1/4 x 3 3/4	4.25	33.60	S by S. . . .	Schebler. . . .	3/4	None. . . .			Mag. . . .	Bosch. . . .	Splash. . . .	O.O. . . .	Cone. . . .	Hand L.	
Neracar.	Vert. . . .	2	1-2 1/2 x 2 3/4	2.50	13.50	2 Port.	Brown & B. . . .		Stock. . . .	Elec. . . .	Own. . . .	Mag. . . .	Own. . . .	Splash. . . .	OwG. . . .	Frie.	G.H.B.	
Reading-Standard. 23TE	Vee. . . .	4	2-3 3/4 x 4	9.11	71.57	S by S. . . .	Schebler. . . .	1 1/4	Opt.	Elec. . . .	Split. . . .	Mag. . . .	Bosch. . . .	Splash. . . .	O.O. . . .	Dry D. . . .	F.P.&H.L.	
Schickel.	T Vert. . .	2	1-3 x 2 1/2	3.60	17.65	2 Port.	Own.		Opt.	Elec. . . .	Own. . . .	Mag. . . .	Split. . . .	Splash. . . .	OwG. . . .	Oil D. . . .	Foot P.	

ABBREVIATIONS:

POWER PLANT:

Vert.—Vertical
S. by S.—Side by Side
O. I. S. E.—Overhead Inlet Side Exhaust
O. E. S. I.—Overhead Exhaust Side Inlet

ELECTRICAL SYSTEM:

Opt—Optional
Elec—Electric
Mag—Magneeto
Batt—Battery
Brng—Berling
Split—Spiltorf

OILING SYSTEM:

O. O.—Oil Only
O. w. G.—Mix Oil with Gasoline
CLUTCH:
Dry D.—Dry Disk
Oil D.—Oil Disk

Frie—Friction

Foot P.—Foot Pedal
F. P. & H. L.—Foot Pedal & Hand Lever
G. H. B.—Grip on Handle Bars
F. P. & G. H. B.—Foot Pedal and Grip on Handle Bars

1923 Motor Busses—Continued

ENGINE			Max. Governed Speed in M. P. H. of Bus.	ELECTRICAL SYSTEM						CLUTCH				GEARSET				SPRINGS		BRAKES		STEERING GEAR		Specification Number	
Fuel System	Gov'nor	Ignition System		Generator		Starter		Voltage	Make	Model	Type	Make	Model	Location	No. of For- ward Speeds	Universal Make	Front Length (Ins.)	Rear Length (Ins.)	Foot Type and Location	Hand Type and Location	Make	Model	Wheels Make		
Carburetor Make	Model	Make		Model	Make	Model	Make																		Model
Zenith.	4	Duplex.	16	Dixie	45	N. E.	3281A	N. E.	3581A	6-8	Own	M.D.D.	Full.	S.	Un.E.	3	Univ.	38	46	I-Rw.	I-Rw.	Lav.	Stand.	64	
John.	A.MB2	Pharo.	25	N.E.		N. E.	3281A	N. E.	3581A	6-8	Fuller	GU	M.D.D.	Full.	GU	Un.E.	3	Own	38	40	E-Rw	I-Rw.	Own	Tuarc.	65
Strom.	G4P			Bosch.	AT6	A-L.	5-1008	A-L.	MHO8	6-8	B.L.	GX12	S.P.	Detr	G	Un.E.	4	Spicer	44	60	E-Rw	I-Rw.	Ross.	BL	66
Ray	05.	Duplex.	27	Bosch.	DU4	West.	760	West.	700	6-8	B.L.	35	M.D.D.	B-L	35	Un.E.	3	Spicer	40	30 1/2	E-Rw	I-Rw.	Gemm.	K.	67
Zenith.	05.	Duplex.	21	Bosch.	DU4					6-8	B-L	35	M.D.D.	B-L	35	Un.E.	4	Spicer	41	51	I-Rw.	I-Rw.	Ross.	BL	68
Zenith.	05.	Duplex.	21	Bosch.	DU4					6-8	B-L	35	M.D.D.	B-L	35	Un.E.	4	Spicer	41	51	I-Rw.	I-Rw.	Ross.	BL	69
Strom.	M2			Remy		Remy		Remy		6-8	B-L	50	M.D.D.	B-L	50	Un.E.	4	Spicer	41	51	I-Rw.	I-Rw.	Ross.	BL	70
Strom.	M2			Bosch	DU-4					6-8	B-L	30	M.D.D.	B-L	30	Un.E.	3	Spicer	38	52	E-Rw	I-Rw.	Jacox	JA.	71
				Bosch	DU-4					6-8	B-L	35	M.D.D.	B-L	35	Un.E.	4	Spicer	38	52	E-Rw	I-Rw.	JA.	North.	72
Zenith.	H-S.			Eisem.	G4.	Dyneto*	493	Dyneto*	391	6-8	B-L	30	M.D.D.	B-L	30	Un.E.	3	Spicer	40	54	I-Rw.	I-Rw.	Ross	XB	73
Strom.	M.		25	Eisem.						6-8	B-L		M.D.D.	B-L		Un.E.	4	Spicer			-Rw.	-Rw.			73A
Strom.	M.			Remy		Remy	914A.	Remy	720A.	6-8	Hoosier.	K5	SP	Detr	Dy208	Un.E.	3	M&E.	38	50	I-Rw.	I-Rw.	Ross	XA	73B
Zenith.	U4.			Remy		Remy	917D.	Remy	720E.	6-8	B-L		SP	B-L	30	Un.E.	3	M&E.	40	51	I-Rw.	I-Rw.	Ross	XB	73C
Strom.	M2			Eisem.	G4	West	150	West	750	6-8	B&B	GX	SP	B-L	50	SU	4	M&E.	42	51	I-Rw.	I-Rw.	Ross.	BL	73D
Strom.	M2			Eisem.	G4	West	150	West	750	6-8	B&B	GX	SP	B-L	50	SU	4	M&E.	42	51	I-Rw.	I-Rw.	Ross.	BL	73E
Strom.	M2	Duplex.	25	Eisem.	G4	Bosch		Bosch		6-8	B-L	50	M.D.D.	B-L	50	S.U.	4	Spicer	46	58	-Rw.	-Rw.	Gemm.	R	74
Zenith.	U4.			Remy		Remy	914A.	Remy	720	6-8	Detl.	H	M.D.D.	Cam	D21	Un.E.	3	Ther.	35	50	I.Rw.	E-Rw	Lav.	1700	75
Strom.	M1	Wauk.	18	Eisem.	G4	Dyneto*	CA	Dyneto*	DA	6-8	B-L	30	M.D.D.	B-L	30	Un.E.	3	Ther.	39	50	I-Rw.	I-Rw.	Lav.	1700	76
Strom.	M2	Duplex.	18	Eisem.	G4	West*				6-8	B-L	50	M.D.D.	B-L	50	Un.E.	3	Ther.	39	50	I-Rw.	I-Rw.	Ross.	BL	77
Strom.	M2			West.	SC	West.	760	West.	711	6-8	Warn.	K19.	M.D.D.	Warn	T38.	Un.E.	3	Snead	39	54	I-Rw.	I-Rw.	Ross	X-B.	78
Strom.	M2	Pierce.	20	Eisem.		Bosch*		Bosch*		6-8	B-L	35	M.D.D.	B-L	35	Un.E.	4	Spicer	39	52	I-Rw.	I-Rw.	Ross	BL	79
Strom.	M2	Pierce.	20	Eisem.		Bosch*		Bosch*		6-8	B-L	50	M.D.D.	B-L	50	Un.E.	4	Spicer	39	52	I-Rw.	I-Rw.	Ross	BL	80
Strom.	M1			Bosch.	3-820	Bosch.	3-820	Bosch.	3-818	6-8	Fuller	SU1	M.D.D.	Full.	SU1	Un.E.	3	Blood	38	48	E-Rw	I-Rw.	Lav.	2100	81
Strom.	Mb1			Bosch.	3-841	Bosch.	3-841	Bosch.	3-582	6-8	Fuller	LTU4	M.D.D.	Full.	LTU4	Un.E.	3	Blood	38 1/2	54	E-Rw	I-Rw.	Lav.	1700	82
Strom.	M1	Mon.	20	A-K.	CA.	Bijur.	L-220.	Bijur.	DZ-IM	6-8	B.&B.	GX12	S.P.	Durst	03400	Un.E.	3	Arrac	40	54	E-Rw	I-Rw.	Ross	RU	83
Zenith.	U5					N.E.		N.E.		12-16	Own		S.P.	Own		S.U.	Own	409	50 1/2	E-Rw	I-Rw.	Own		84	
Zenith.	U6R	Own.				L-N*		L-N*		12-16	Own		S.P.	Own		Un.E.	4	Spicer	41 1/2	60	E-Rw	I-Rw.	Own		85
Zenith.	L5	Pierce	25	Eisem.	GA4	Eisem.	M4 G6				B-L	35	M.D.D.	B-L	35	Un.E.	4	Spicer		54 1/2	I-Rw.	I-Rw.	Ross	BU	86
Zenith	U4			Bosch	ZR4						B-L	30	M.D.D.	B-L	30	Un.E.	3	Spicer			E-Rw	E-Da.	Gemm.	L	87

ns of 1923 Motorcycles

TRANSMISSION								FRAME, WHEELS, ETC.															MAKE AND MODEL			
GEARSET		GEAR RATIOS				Wheelbase (ins.)	Tire Size (ins.)	Frame Type	Front Fork Spring	Rear Wheel Spring?	Starting System	BRAKES		Maximum High Speed (M.P.H.)	CAPACITIES		Height of Saddle above Ground (ins.)	Road Clearance (Exclusive of Pedals, ins.)	WEIGHT (lbs.)		PRICE					
Type	No. of Forward Speeds	Reverse Speed Fitted?	Engine to Gearset	Low	Second							Third	Final Drive Type		Feet	Hand			Gas Tank (Gals.)	Oil Tank (Qt.)	Int*	Ext.		Int*	Ext.	Empty	Ready for Road	Not Equipped	Equipped
Prog.....	3	No...	1.65	9.00	7.00	4.00	Cnnain...	59	27x3½	Cradle	H.S.	No...	Kick...	Ext...	Ext...	3½	3	29	5½	365	395	\$303	\$335	Ace.....		
Pos.C.....	2	No...					Chain...	56½	26x3	Special	H.S.	No...	Kick...	Ext...	Ext...	40	2¼			185	200	185	220	Cleveland 23ML & 23E		
Selec. one.....	3	No...	4.13	9.92	6.76	4.13	Chain...	58½	27x3½	Diam	H.S.	No...	Kick...	Ext...	Int*	65	3¼	4	27½	6	390	400		310	Excelsior..... 1923	
	1	No...					Belt...	50	28x1½	Diam	No...	No...	Pedals...	Hub...		30	1½		29½	6	70	80		135	Evans..... 1923	
Prog.....	3	No...	2.39	9.22	6.15	4.10	Chain...	60	28x3	Loop	H.S.	No...	Kick...	Ext...	Int†	3½	4½	29½		382	405		330	Harley-Davidson..... JD		
Prog.....	3	No...	2.39	9.22	6.15	4.10	Chain...	60	28x3	Loop	H.S.	No...	Kick...	Ext...	Int†	65	3½	4½	29½		358	380	310		Harley-Davidson..... FD	
Prog.....	3	No...	2.53	9.76	6.51	4.34	Chain...	60	28x3	Loop	H.S.	No...	Kick...	Ext...	Int†	65	3½	4½	29½		376	400		305	Harley-Davidson..... J	
Prog.....	3	No...	2.53	9.76	6.51	4.34	Chain...	60	28x3	Loop	H.S.	No...	Kick...	Ext...	Int†	65	3½	4½	29½		352	375		285	Harley-Davidson..... F	
Selec. one.....	3	Yes...	1.64	11.13	5.67	3.49	Chain...	58½	27x3½	Loop	H.S.	No...	Kick...	Ext...	Int*	75	3½	3	27	5½	411	420		398	Henderson..... 1923	
Prog.....	3	No...	2.56	12.05	7.66	4.88	Chain...	54	26x3	Loop	L.S.	No...	Kick...	Int...	Ext...	3	3	28	5	310	340	250	285	Indian..... Scout		
Prog.....	3	No...	2.55	13.24	8.42	5.36	Chain...	60½	28x3	Loop	L.S.	No...	Kick...	Int...	Ext...	3½	3½	30	5	390	425		325	Indian..... Chief 61		
Prog.....	3	No...	2.55	13.24	8.42	5.36	Chain...	60½	28x3	Loop	L.S.	No...	Kick...	Int...	Ext...	3½	3½	30	5	390	425		345	Indian..... Chief 74		
Prog.....	3	No...	2.37	10.10	6.50	4.08	Chain...	59½	28x3	L.&C.S.	L.S.	Yes...	Kick...	Int...	Ext...	3½	3	32	5½	385	410	275	310	Indian..... Standard		
Hub.....	2	No...		6.50	3.25		Chain...	58	28x3	Diam	L.S.	No...	Kick...	Hub...		2	2	32	6	260					Iver Johnson..... 16-7	
Hub.....	2	No...		6.25	3.25		Chain...	58	28x3	Diam	L.S.	No...	Kick...	Hub...		2½	2	32	6	220					Iver Johnson..... 16-4	
None.....	1	No...					Belt...	58	28x2½	Diam	L.S.	No...	No...	Pedals...	Hub...	2	1½	32	6	215					Iver Johnson..... V	
Frie.....	5	No...		11.50	8.62	5.75	Chain...	55½	26x3	Special	H.S.	No...	Kick...	Int...		35	2¼		27	6	180				185	Neracar.....
Prog.....	3	No...	2.25	9.20	6.00	3.91	Chain...	58	28x3	Diam	H.S.	No...	Kick...	Int...	Ext...	75	3	4	30	5½	366	392	290	315	Reading-Standard 23TE	
D.D.....	2	No...	9.00	9.00	6.00		Chain...	53	26x2½		H.S.	No...	Kick...	Ext...		45	1¼	½	28	5½	105		150	160	Schickel..... T	

GEARSET:
Sele—Selective
Prog—Progressive
Hub—Two Speed Hub

D. D.—Direct Drive
FRAME TYPE:
Diam—Diamond
L. & C. S.—Loop & Cradle Springs

FRONT FORK SPRING:
L. S.—Leaf Spring
H. S.—Helical Spring
BRAKES:
Ext—External

Int—Internal
Hub—Conster Hub
†—Optional at extra cost
*—Operated by Foot

Mechanical Specificatio

MAKE AND MODEL	GENERAL								BATTERY						PERFORMANCE	
	Body Type	Number of Pas- sengers	Price Com- plete	Price With- out Battery	Wheel base (Ins.)	Tread (Ins.)	Tire Size (Ins.)	Weight Com- plete (Lbs.)	Make	Model	Price	Voltage	Ampere Hour Capacity	Location	Miles per Charge with Full Load	Speed with Full Load (M.P.H.)
Detroit.....90	Coupe.....	4	\$2800	\$2575	100	56	32x4	.....	Phila.....	WTXI.....	\$414	84	153	½UH & ½RC	80-100	25
Detroit.....91-3	Brougham.....	5	3500	3250	100	56	32x4½	3950	Phila.....	WTXI.....	435	84	175	½UH & ½RC	80-100	25
Milburn.....27-L	Brougham.....	5	2235	.....	105	55	33x4	3080	Phila.....	13-WTXI.....	.....	80	153	½UH & ½RC	70-90	24
Rauch & Lang.....S-66	Sedan.....	4	4250	.....	102	56	32x4½	.....	Exide.....	Special.....	.....	.....	175-200	½UH & ½RC	60-100	25
Rauch & Lang.....B-66	Brougham.....	4	4250	.....	102	56	32x4½	.....	Exide.....	Special.....	.....	.....	175-200	½UH & ½RC	60-100	25
Rauch & Lang.....C-55	Coach.....	5	4250	.....	102	56	33x4½	.....	Exide.....	Special.....	.....	.....	175-200	½UH & ½RC	60-100	25

ABBREVIATIONS:
BATTERY:
Phila—Philadelphia

†—Make Optional

1/2 U. H. and 1/2 R. C.—1/2 under hood and 1/2 rear compartment

MOTOR:
Elw.-Par—Elwell-Parker

Gen. Elec—General Electric

Unit with J. S.—Unit with jack-shaft

Unit with R. A.—Unit with rear axle

CONTROLLER:
Under S—Under seat

Mechanical Specifications

MAKE AND MODEL	GENERAL						MOTOR				CONTROLLER			DRIVE			
	Tons Capacity	Weight with Battery	Price of Chassis with Battery	Price of Chassis without Battery	Wheel Base	TIRES TYPE AND SIZE	Location	Make	Number	Total Horse Power	Location	Lever Location	Number of Forward Speeds	First Reduction	Final Drive	Total Gear Reduction (Motor to Wheels)	Type of Axle or Jack-shaft
C. T.....D1	1 1/2	2200†	.....	\$1585	100	C-36x3	Unit with R.A.	G. E.....	2	3	Steer. col.	Below S.W.	4	Spur.....	Spur.....	11.5	Float.....
C. T.....B15, D15*	3 3/4	2300†	.....	1985	116	S-36x3	Unit with R.A.	G. E.....	2	3	Steer. col.	Below S.W.	4	Spur.....	Spur.....	11.5	Float.....
C. T.....D2 & B2*	1	2400†	.....	2150	124	S-36x3 1/2	Unit with R.A.	G. E.....	2	3	Steer. col.	Below S.W.	4	Spur.....	Spur.....	11.5	Float.....
C. T.....B4	2	4000†	.....	2575	116	S-36x4	Unit with R.A.	G. E.....	2	4	Steer. col.	Below S.W.	4	Spur.....	Spur.....	12.1	Float.....
C. T.....C6	3	4200†	.....	2575	116	S-36x4	Unit with R.A.	G. E.....	2	4	Steer. col.	Below S.W.	4	Spur.....	Spur.....	28.6	Dead.....
C. T.....C7 & A7*	3 1/2	5000†	.....	3550	126	S-36x5	Unit with R.A.	G. E.....	2	4	Steer. col.	Below S.W.	4	Spur.....	Spur.....	17.3	Dead.....
C. T.....A10	5	6500†	.....	3960	132	S-36x7	On F & R Axles	G. E.....	4	6	Steer. col.	Below S.W.	4	Spur.....	Spur.....	20.1	Dead.....
Ehrlich.....A-Z	1-3 1/2	.....	.....	.....	.....	S-36x4	Unit with R.A.	West.....	1	4	Under S.....	Left of S.....	5	Herr.....	Herr.....	20.0	Float.....
Kelland.....A	1 1/2	3250	\$2200	1550	102	S-34x3	Separate.....	G. E.....	1	5-6	Under F.....	Right of S.....	4	Spur.....	Spur.....	13.0	Float.....
Kelland.....B	3 3/4	3050	3020	1650	102	S-34x3 1/2	Separate.....	G. E.....	1	3-6	Under F.....	Right of S.....	4	Spur.....	Bevel.....	13.0	Float.....
Kelland.....C	1	3850	2656	1750	102	S-34x3 1/2	Separate.....	G. E.....	1	3-6	Under F.....	Right of S.....	4	Spur.....	Bevel.....	13.0	Float.....
Lansden.....BG	3 3/4	.....	.....	1600	108	P-32x4 1/2	Unit with R.A.	G. E.....	.....	.....	Under H.....	Below S.W.	4	Herr.....	Bevel.....	12.7	Float.....
Lansden.....C	1	.....	.....	1850	108	S-36x3	Unit with J.S.	G. E.....	.....	.....	Under H.....	Below S.W.	4	Bevel.....	Chain.....	11.9	3/4 Float.....
Lansden.....D	2	.....	.....	2250	121	S-36x4	Unit with J.S.	G. E.....	.....	.....	Under H.....	Below S.W.	4	Bevel.....	Chain.....	12.8	3/4 Float.....
Lansden.....E	3 1/2	.....	.....	2950	133	S-36x5	Unit with J.S.	G. E.....	.....	.....	Under H.....	Below S.W.	4	Bevel.....	Chain.....	13.1	3/4 Float.....
Lansden.....F	5	.....	.....	3350	146	S-36x7	Unit with J.S.	G. E.....	.....	.....	Under H.....	Below S.W.	4	Bevel.....	Chain.....	12.3	3/4 Float.....
Milburn.....27D	1 1/2	2925	1085	.....	115	P-33x4	Unit with J.S.	G. E.....	1	4	Under S.....	Left of S.....	4	.....	Worm.....	10.3	1/2 Float.....
Milburn.....43	1 1/2	.....	.....	1585	115	P-32x4 1/2	Unit with J.S.	G. E.....	1	4	Under S.....	Below S.W.	4	.....	Worm.....	10.3	Dead.....
Milburn.....40	1	.....	.....	1985	128	P-32x4 1/2	Unit with J.S.	G. E.....	1	5	Under S.....	Below S.W.	4	.....	Worm.....	14.6	Dead.....
Walker.....12	1 1/2	.....	.....	.....	104	S-32x3	Separate.....	G. E.....	1	.....	Under F.....	Right of S.....	4	None.....	Bevel.....	5.5	1/2 Float.....
Walker.....22	1	.....	.....	.....	101	S-34x3 1/2	Unit with R.A.	West.....	1	.....	Under S.....	Left of S.....	5	None.....	Spur.....	16.9	Float.....
Walker.....42	2	.....	.....	.....	114	S-36x4	Unit with R.A.	West.....	1	.....	Under S.....	Left of S.....	5	None.....	Spur.....	14.6	Float.....
Walker.....P	3 1/2	.....	.....	.....	131	S-36x5	Unit with R.A.	West.....	1	.....	Under S.....	Left of S.....	5	None.....	Spur.....	18.2	Float.....
Walker.....N	5	.....	.....	.....	141	S-36x6	Unit with R.A.	West.....	1	.....	Under S.....	Left of S.....	5	None.....	Spur.....	18.2	Float.....
Walter.....EN	2	7000	3615	2575	114	S-36x4	Unit with J.S.	G. E.....	1	5	Under S.....	Right of S.....	5	Bevel.....	Spur.....	14.0	Float.....
Walter.....EL	3 1/2	8000	4740	3475	132	S-36x4	Unit with J.S.	G. E.....	1	6	Under S.....	Right of S.....	5	Bevel.....	Spur.....	13.0	Float.....
Walter.....ES	5	10500	5520	3975	150	S-36x6	Unit with J.S.	G. E.....	1	7	Under S.....	Right of S.....	5	Bevel.....	Spur.....	.....	Float.....
Ward.....WS-2	1 1/2	4650	.....	.....	88	S-32x3	Unit with P.S.	G. E.....	1	3	Under F.....	Left of S.....	4	None.....	Worm.....	14.6	1/2 Float.....
Ward.....WA-3 & WA-4	3 3/4	7200	.....	.....	96	S-32x3 1/2	Unit with P.S.	G. E.....	1	4	Under F.....	Left of S.....	4	None.....	Worm.....	14.6	1/2 Float.....
Ward.....WM-2	1-1 1/2	9000	.....	.....	96	S-32x3 1/2	Unit with P.S.	G. E.....	1	5	Under F.....	Left of S.....	4	None.....	Worm.....	14.6	1/2 Float.....
Ward.....WB-3 & WB-4	1 1/2	10000	.....	.....	108	S-34x4	Unit with P.S.	G. E.....	1	5	Under F.....	Left of S.....	4	None.....	Worm.....	14.6	1/2 Float.....
Ward.....WD-3 & WD-4	2 1/2	14000	.....	.....	120	S-36x5	Unit with P.S.	G. E.....	1	6	Under F.....	Left of S.....	4	None.....	Worm.....	17.6	1/2 Float.....
Ward.....WF-3 & WF-4	3 1/2	20000	.....	.....	132	S-36x6	Unit with P.S.	G. E.....	1	8	Under F.....	Left of S.....	4	None.....	Worm.....	13.0	1/2 Float.....
Ward.....WH-3 & WH-4	5	28000	.....	.....	146	S-36x7	Unit with P.S.	G. E.....	1	10	Under F.....	Left of S.....	4	None.....	Worm.....	13.0	1/2 Float.....

*—Made in various wheelbase lengths

†—Weight without battery

TIRES
C—Cushion

S—Solid

d—Dual

P—Pneumatic

MOTOR
Unit with J. S.—Unit with jack-shaft

On F. & R. Axles—On front and rear axles

Unit with P. S.—Unit with propeller shaft

Unit with R. A.—Unit with rear axle

G. E.—General Electric

West.—Westinghouse

CONTROLLER
Under S—Under seat

Under F—Under floor

Under H—Under hood

Steer. Col—Steering column

Specifications of Value to

TO THE dealer and maintenance man the preceding pages of specifications offer a ready reference such as no text book provides. They have been prepared with utmost care and are correct so far as it is humanly possible to make them.

In practically every case the figures have been supplied directly by the car, truck, tractor, motorcycle, and isolated light plant maker.

The dealer who wants to know the age of a car he has taken in on a trade will

find in the serial numbers of the cars exactly the age of the particular car in question. Likewise, the maintenance man will find the mechanical specifications invaluable in determining the bore and stroke of a certain engine, the type

ns of 1923 Electric Cars

MOTOR					CONTROLLER		DRIVE					SPRINGS		Wheels (Standard Equip- ment)	MAKE AND MODEL
Make	Model	Number	Total Horse Power	Location	Make	Location	Number of For- ward Speeds	Type of Final Drive	Type of Rear Axle	Total Reduc- tion (Motor to Wheels)	Propul- sion Taken by	Torque Taken by	Type Front	Type Rear	
Elw-Par....	22-17	1	3	Unit with J.S.	Own....	Under S....	5	....	$\frac{1}{4}$ Float.	....	Springs....	Springs....	$\frac{1}{4}$ Ell.	$\frac{1}{4}$ Ell.	Art....
Elw-Par....	31-20	1	3	Unit with J.S.	Own....	Under F....	5	....	$\frac{1}{4}$ Float.	....	Tor.arm....	Tor.arm....	$\frac{1}{4}$ Ell.	$\frac{1}{4}$ Ell.	Wire....
Gen. Elec....	1085	1	4	Unit with R.A.	Own....	Under S....	4	Worm.	$\frac{1}{4}$ Float.	9.75	Springs....	Tor.tube.	$\frac{1}{4}$ Ell.	F.Ca.	Wire....
Own....	....	1	$3\frac{1}{2}$	Unit with R.A.	Own....	Under S....	5	Worm.	$\frac{1}{4}$ Float.	8.60	Springs....	Tor.arm....	$\frac{1}{4}$ Ell.	$\frac{1}{4}$ Ell.	Art....
Own....	....	1	$3\frac{1}{2}$	Unit with R.A.	Own....	Under S....	5	Worm.	$\frac{1}{4}$ Float.	8.60	Springs....	Tor.arm....	$\frac{1}{4}$ Ell.	$\frac{1}{4}$ Ell.	Art....
Own....	....	1	$3\frac{1}{2}$	Unit with R.A.	Own....	Under S....	5	Worm.	$\frac{1}{4}$ Float.	8.60	Springs....	Tor.arm....	$\frac{1}{4}$ Ell.	$\frac{1}{4}$ Ell.	Art....

Under F—Under floor

Tor. Arm—Torque arm

SPRINGS:

F. Ca—Floating Cantilever

DRIVE:

Tor. Tube—Torque tube

 $\frac{1}{2}$ Ell— $\frac{1}{2}$ Elliptic

WHEELS:

 $\frac{1}{4}$ Float— $\frac{1}{4}$ Floating $\frac{3}{4}$ Ell— $\frac{3}{4}$ Elliptic

Art—Artillery

of 1923 Electric Trucks

DRIVE		Steering Wheel Location	Distance from Ground to Top of Frame at Dash (Ins.)	SPRINGS		BATTERY										PERFORMANCE				MAKE AND MODEL
Propulsion Taken By	Torque Taken By			Type, Front	Type, Rear	Location	Make	Model	Price	Voltage	Ampere Hour Capacity	Number of Plates	Number of Cells	Number of Trays	Miles per Charge		Speed in M.P.H.			
														Loaded	Light	Loaded	Light			
Rad. & spr.	Rad. & spr.	Left	32½	½ Ell.	½ Ell.	Under F.A.	Optional.									13	14	C. T.	D1	
Rad. & spr.	Rad. & spr.	Left	32	½ Ell.	½ Ell.	Under F.A.	Optional.									13	14	C. T.	B15, D15*	
Rad. & spr.	Rad. & spr.	Left	33	½ Ell.	½ Ell.	Under F.A.	Optional.									12	14	C. T.	D2 & B2*	
Rad. & spr.	Rad. & spr.	Left	35¼	½ Ell.	½ Ell.	Under F.A.	Optional.									10	12	C. T.	B4	
Rad. & spr.	Rad. & spr.	Left	36½	½ Ell.	½ Ell.	Under F.A.	Optional.									7	8	C. T.	C6	
Rad. & spr.	Rad. & spr.	Left	36¼	½ Ell.	½ Ell.	Under F.A.	Optional.									8	10	C. T.	C7 & A7*	
Rad. & spr.	Rad. & spr.	Left	38½	½ Ell.	½ Ell.	Under F.A.	Optional.									8	10	C. T.	A10	
Springs	Springs	Left		Ell.	Ell.	Under F.A.	Edison	A-8			300		60	6	50	65	14	14	Ehrlich	A-Z
Springs	Springs	Left	29½	½ Ell.	½ Ell.	Under S.	Exide†	Ironclad	650	83	136	9	42	12	35	45	14	16	Kelland	A
Springs	Springs	Left	30	½ Ell.	½ Ell.	Under S.	Edison†	A-5	1470	72	187½	5	60	14	40	50	13	15	Kelland	B
Springs	Springs	Left	30½	½ Ell.	½ Ell.	Under S.	Exide†	Ironclad	906	83	204	13	42	12	45	55	12	14	Kelland	C
Springs	Tor. Arm.	Left	30	½ Ell.	½ Ell.	Under S.	Edison								50		14	15	Lansden	BC
Rad. rods.	Springs	Left		½ Ell.	½ Ell.	Under F.A.	Edison								50		10	12	Lansden	C
Rad. rods.	Springs	Left	34	½ Ell.	½ Ell.	Under F.A.	Edison												Lansden	D
Rad. rods.	Springs	Left	39	½ Ell.	½ Ell.	Under F.A.	Edison								45		8	10	Lansden	E
Rad. rods.	Springs	Left	39	½ Ell.	½ Ell.	Under F.A.	Edison								40		7	9	Lansden	F
Tor. tube.	Tor. tube.	Left		½ Ell.	Cant.	Under H.F.	Optional.					13	40		50	60	20		Milburn	27D
Springs	Springs	Left		½ Ell.	½ Ell.	Under H.F.	Optional.								45	53	18		Milburn	43
Springs	Springs	Left		½ Ell.	½ Ell.	Under H.F.	Optional.								40	50	8	15	Milburn	40
Springs	Springs	Left	25	½ Ell.	½ Ell.	Under H.F.	Optional.												Walker	12
Springs	Springs	Left	34	½ Ell.	½ Ell.	Under F.A.	Optional.												Walker	22
Springs	Springs	Left	35	½ Ell.	½ Ell.	Under F.A.	Optional.												Walker	42
Springs	Springs	Left	40	½ Ell.	½ Ell.	Under F.A.	Optional.												Walker	P
Springs	Springs	Left	40	½ Ell.	½ Ell.	Under F.A.	Optional.												Walker	N
Springs	Springs	Left	36	½ Ell.	½ Ell.	Under F.A.	Exide	Ironclad	1040	85	240	15	42	8	40	60	13	15	Walter	EN
Springs	Springs	Left	36	½ Ell.	½ Ell.	Under F.A.	Exide	Ironclad	1265	85	325	19	42	8	40	60	12	14	Walter	EL
Springs	Springs	Left	41	½ Ell.	½ Ell.	Under F.A.	Exide	Ironclad	1550	85	400	23	42	8	40	60	10	12	Walter	ES
Springs	Springs	Left	29	½ Ell.	½ Ell.	Under S.	Optional.								50	65	13	14	Ward	WS-2
Springs	Springs	Left	33¼	½ Ell.	½ Ell.	Under F.A.	Optional.								60	75	11	13	Ward	WA-3 & WA-4
Springs	Springs	Left	23½	½ Ell.	½ Ell.	Rear over F.	Optional.								60	77	10	12	Ward	WM-2
Springs	Springs	Left	34½	½ Ell.	½ Ell.	Under F.A.	Optional.								48	63	10	12	Ward	WB-3 & WB-4
Springs	Springs	Left	33	½ Ell.	½ Ell.	Under S.	Optional.								57	76	9	11	Ward	WD-3 & WD-4
Springs	Springs	Left	33	½ Ell.	½ Ell.	Under S.	Optional.								44	75	8	10	Ward	WF-3 & WF-4
Springs	Springs	Left	36	½ Ell.	½ Ell.	Under S.	Optional.								38	65	7	9	Ward	WH-3 & WH-4
Springs	Springs	Left	38	½ Ell.	½ Ell.	Under S.	Optional.													

Below S. W.—Below steering

DRIVE

Rad. Rods—Radius rods

BATTERY

Left of S—Left of seat

Herr—Herringbone gear

Tor. Arm—Torque arm

Under F. A.—Under frame amid-

Right of S—Right of seat

Float—Floating

Rad. & Spr—Radius rods and

ships

 $\frac{1}{4}$ Float— $\frac{1}{4}$ Floating $\frac{1}{2}$ Ell— $\frac{1}{2}$ Elliptic

Under S—Under seat

 $\frac{3}{4}$ Float— $\frac{3}{4}$ Floating

Cant—Cantilever

Rear over F—Rear over frame

Under H. F.—Under hood in front

—Make Optional

Dealer and Maintenance Man

and make of rear axle used in a certain make car, etc. The tables, in fact, present in a concrete form what the automotive industry has to offer for the 1923 season. In addition the serial numbers give a ready reference to the models which have gone before.

The dealer who wishes to take on a

new line is able to make comparisons by using the specifications. He also might be considering taking on motorcycles in connection with his motor car business. Here the motorcycle specifications will help him to look over the field. The same is true of the isolated light plant or the tractor. MOTOR AGE has maintained for

some time that the motor car dealer is well qualified in many localities to handle the tractor, the truck, the motorcycle, etc. and for that reason we include these units in the annual specification issue. Those pages should prove useful to the dealer throughout the entire year and will do so even more as time goes on.

12,357,376 Cars and Trucks Registered in United States

Gain of 1,851,716 Over Last Year. Increase of 17.6 Per Cent. One Car for Every 8.7 Persons. Heavy Production and Old Cars Brought Back Into Use After Depression, Account for Tremendous 1922 Registration

All tabulations from AUTOMOTIVE INDUSTRIES

THE amazing total of 12,357,376 cars and trucks registered for use in the United States on Dec. 31, 1922, is the dealer's answer to his banker or any other person who is suspicious that the automotive vehicle has reached the saturation point. This amazing increase—fully a half million vehicles—above the expectations is definite proof that the automotive vehicle is a business proposition and that its use is in keeping with the prosperity of the country.

The gain in registration on Dec. 31 over the same date of 1921 is 1,851,716 cars and trucks. Such a gain is not justified by the production of 1922, which is estimated at slightly more than 2,500,000 vehicles. The difference between the gain in registration and the production is not sufficient to account for export and junked cars.

The answer is, of course, that many cars that were not registered in 1921 were registered in the more prosperous year of 1922. This means that thousands of used cars that were in dealer or other storage during 1921 were on the road in 1922. Especially is this true of cars used in strictly commercial purposes, such as trucks, salesmen's cars, and vehicles in similar use. It is a well known fact that the vehicle of purely business use is put into storage much more quickly than the vehicle that is in recreational, social or personal business use.

A more obvious situation of this same sort occurred in the registration of 1917 and 1918 when the increase of registration was greater than the total of the cars registered in 1917 and the production in 1918. The increased demand for individual transportation and flexible freight transportation in 1918 brought many vehicles out of storage that had been counted as permanently discarded.

The percentage of gains in the various states does not entirely carry out the theory of where the greatest sales have been during the last year. It would appear from a reading of the leaders in percentage gains that the agricultural states shared the honors about equally with the industrial states.

In previous registration surveys there have been some states that showed a decrease in the number of vehicles registered. Last year, however, every state had more cars and trucks in use on Dec. 31 than on the same date in 1921. This is in contrast to the situation a year ago when four states showed lower

Registration of Motor Vehicles

State	Total Registration of Cars & Trucks	Passenger Cars	Trucks	Motorcycles	Total Fees
Alabama	90,052	80,183	9,869	638	\$2,000,000*
Arizona	38,625	.....	.....	.....	215,000*
Arkansas	83,583	76,583	7,000	240	998,531
California	842,663	803,710	38,953	16,074	8,299,660
Colorado	162,170	151,420	10,750	27,090	992,000
Connecticut	156,000	130,000	26,000	.....	3,000,000
Delaware	24,500	19,500	5,000	426	426,000
District of Columbia	85,425	76,593	8,832	2,494	367,773
Florida	117,000	97,000	20,000	.....	1,000,000*
Georgia	144,226	126,900	17,326	.....	2,000,000*
Idaho	53,900	49,422	4,478	703	819,291
Illinois	786,190	686,466	99,724	8,156	7,882,323
Indiana	472,000	415,000	57,000	7,000	3,000,000
Iowa	499,446	468,099	31,347	3,563	7,799,890
Kansas	327,185	303,717	23,468	2,315	165,788
Kentucky	152,870	135,702	17,168	1,097	2,138,716
Louisiana	102,284	87,003	15,281	509	1,756,226
Maine	91,710	78,453	13,257	.....	1,500,000
Maryland	162,570	150,669	11,901	4,956	3,200,000*
Massachusetts	449,838	384,123	65,715	11,675	5,685,527
Michigan	578,980	518,558	60,422	5,163	7,807,145
Minnesota	380,525	341,299	39,226	3,238	6,532,042
Mississippi	76,300	70,430	5,870	95	3,016,000
Missouri	391,669	351,686	39,983	.....	3,498,957
Montana	62,649	55,681	6,968	397	619,101
Nebraska	256,654	233,658	22,996	1,845	3,023,071
Nevada	12,647	10,000	2,647	112	120,937
New Hampshire	48,446	41,496	6,950	1,880	1,246,229
New Jersey	337,700	254,000	83,700	9,300	6,475,000
New Mexico	25,473	.....	.....	.....	350,000*
New York	1,000,732	779,964	220,768	25,161	12,718,074
North Carolina	182,550	163,600	18,950	1,190	2,826,075
North Dakota	99,100	96,127	2,973	766	699,000
Ohio	861,000	741,000	120,000	14,300	7,864,602
Oklahoma	249,659	.....	.....	952	2,729,169
Oregon	134,566	123,831	10,735	3,206	3,340,446
Pennsylvania	829,737	763,916	65,821	19,316	12,531,582
Rhode Island	66,500	53,489	13,011	.....	1,100,000*
South Carolina	95,978	88,400	7,578	605	741,714
South Dakota	125,233	116,136	9,097	660	107,960
Tennessee	135,745	119,361	16,384	861	1,589,824
Texas	526,670	.....	.....	3,410	4,052,456
Utah	49,156	41,935	7,221	725	749,272
Vermont	43,881	41,241	2,640	856	781,982
Virginia	169,000	146,000	23,000	.....	2,900,000*
Washington	243,157	211,216	31,941	.....	4,000,000*
West Virginia	112,752	.....	.....	1,361	2,000,000
Wisconsin	388,044	361,222	26,822	5,918	4,153,376
Wyoming	30,636	27,409	3,227	305	316,849
TOTALS	12,357,376	10,072,198	1,331,999	188,558	\$151,137,538

* Estimated.

Motor Vehicle Registration 1912 to 1922

	1912	1914	1915	1916	1917	1918	1919	1920	1921	1922
Alabama	3,385	8,078	11,925	21,636	32,873	46,171	58,898	74,637	82,343	90,082
Arizona	1,624	5,040	7,318	12,124	19,890	23,905	28,979	34,559	33,049	38,625
Arkansas	2,250	5,442	8,021	15,000	28,693	41,458	49,450	59,082	67,446	83,583
California	88,699	123,516	163,795	232,440	306,916	364,800	477,450	568,892	673,830	842,663
Colorado	9,950	17,756	27,588	43,296	66,850	83,430	104,665	129,951	145,739	162,170
Connecticut	24,101	33,009	43,985	61,855	85,724	92,605	109,651	119,134	137,526	156,000
Delaware	1,732	3,050	4,657	7,102	10,700	12,956	16,182	18,300	21,413	24,500
District of Col.	1,732	4,833	8,009	13,118	15,493	30,490	36,400	9,712	61,745	85,425
Florida	1,749	3,368	10,850	20,718	27,000	54,186	55,400	73,914	97,637	117,052
Georgia	19,120	20,916	25,671	47,579	70,387	99,800	127,326	144,422	131,942	144,226
Idaho	2,500	3,346	7,071	12,959	24,731	32,289	42,220	50,873	51,294	53,900
Illinois	68,073	131,140	180,832	248,429	340,292	389,620	478,438	568,759	670,434	786,190
Indiana	54,334	66,400	96,915	139,317	192,192	227,160	277,255	332,707	400,342	472,000
Iowa	47,188	112,134	182,134	198,602	254,317	278,313	363,857	437,300	460,526	499,446
Kansas	22,000	49,374	72,520	112,122	159,343	189,163	227,732	266,396	291,309	327,185
Kentucky	5,147	11,748	19,500	31,700	47,416	65,870	90,641	112,685	126,371	152,870
Louisiana	7,000	12,000	11,360	17,000	26,394	40,000	51,000	66,000	80,500	102,284
Maine	7,743	16,700	21,545	30,972	41,499	40,372	53,425	62,907	77,527	91,710
Maryland	10,487	20,213	31,047	44,245	60,943	74,666	95,634	116,341	140,572	162,570
Massachusetts	50,132	77,248	102,633	136,809	174,274	193,497	247,183	304,631	360,732	449,838
Michigan	39,579	76,389	114,948	160,052	247,006	262,125	325,813	412,717	477,037	578,980
Minnesota	29,000	67,862	93,269	46,000	54,009	204,458	259,743	65,517	328,700	380,525
Mississippi	2,895	5,964	9,669	25,000	36,600	48,400	46,030	63,484	65,139	76,300
Missouri	24,739	54,468	76,462	103,587	147,528	188,040	244,363	296,919	346,437	391,669
Montana	2,000	10,172	14,499	24,440	42,696	51,037	59,325	60,646	58,785	62,649
Nebraska	33,861	40,929	50,140	100,534	148,101	175,409	192,000	223,000	238,704	256,654
Nevada	900	1,487	2,009	4,919	7,160	8,159	9,306	10,464	10,819	12,647
New Hampshire	5,764	9,571	13,499	17,508	22,267	24,817	31,625	34,680	42,039	48,446
New Jersey	43,556	60,247	72,332	104,341	134,964	155,519	190,873	227,737	272,994	337,700
New Mexico	911	2,945	5,100	8,228	8,457	15,000	19,077	22,109	24,703	25,473
New York	107,862	169,868	234,032	317,866	411,567	463,758	571,662	689,290	812,031	1,000,732
North Carolina	6,178	14,677	21,000	33,904	55,950	72,313	109,017	140,860	148,684	182,550
North Dakota	8,997	16,701	24,908	40,446	62,993	71,627	82,885	90,840	92,644	99,100
Ohio	63,066	122,504	181,332	252,431	346,772	412,775	511,031	615,397	720,632	861,000
Oklahoma	6,524	13,500	25,032	82,718	100,199	121,500	144,500	204,300	221,300	249,699
Oregon	10,165	16,447	22,585	33,917	48,632	63,324	83,332	103,790	116,325	134,566
Pennsylvania	59,357	112,864	160,137	230,578	325,153	394,186	482,117	570,164	689,589	829,737
Rhode Island	8,565	12,331	16,362	21,406	37,046	36,218	44,833	50,375	54,957	66,500
South Carolina	10,000	14,500	15,000	19,000	39,527	55,492	70,143	92,818	90,546	95,978
South Dakota	14,481	20,829	26,784	44,271	67,158	90,521	104,628	120,395	119,274	125,233
Tennessee	35,187	19,769	7,618	30,000	48,000	63,000	80,422	101,852	117,025	135,745
Texas	25,176	64,732	90,000	197,687	213,334	251,118	331,310	427,693	467,616	526,670
Utah	2,587	2,253	9,177	13,607	24,076	32,273	35,236	42,578	47,423	49,156
Vermont	4,283	8,256	11,499	15,671	20,369	22,655	26,807	31,625	36,965	43,881
Virginia	5,760	14,002	21,357	35,426	55,000	72,228	94,120	134,000	141,000	169,000
Washington	13,990	30,253	38,423	60,734	91,337	117,278	146,775	173,920	185,369	243,157
West Virginia	5,349	6,159	13,279	20,571	31,300	38,750	50,203	78,852	93,894	112,752
Wisconsin	24,573	53,161	79,791	115,637	164,531	196,844	236,981	293,296	341,841	388,044
Wyoming	1,300	2,428	3,976	7,125	12,523	16,200	21,371	23,926	26,619	30,636
Totals	1,033,096	1,768,720	2,479,742	3,584,567	4,992,152	6,105,974	7,596,503	8,932,458	10,505,660	12,357,376

figures than in 1920. The delinquents last year were Georgia, South Carolina, Montana and South Dakota. These four states together showed a decrease in 1921 of 17,734 as compared with 1920. This year they show a total gain of 27,539 over 1921, a net increase of 9805 over the previous high point of 1920.

The greatest numerical gains were made in the high registration states as usual. New York, California, Ohio, Pennsylvania, Illinois, Michigan and Massachusetts lead the list of actual gains in the order named.

The first ten states in total registrations are as follows:

REGISTRATIONS OF CARS AND TRUCKS
Dec. 31, 1922

New York	1,000,732
Ohio	861,000
California	842,663
Pennsylvania	829,737
Illinois	786,190
Michigan	578,980
Texas	526,670
Iowa	499,446
Massachusetts	449,838
Indiana	472,000
Missouri	391,669
Wisconsin	388,044
Minnesota	380,525
New Jersey	337,700
Kansas	327,185
Nebraska	256,654
Oklahoma	249,659
Washington	243,157
North Carolina	182,550
Virginia	169,000
Maryland	162,570
Colorado	162,170
Connecticut	156,900
Kentucky	152,870

New York has far outstripped Ohio, which has always been a keen rival for registration leadership. California has displaced Pennsylvania as the occupant of third place, while Massachusetts has passed Indiana in the list.

Massachusetts and California have made greater percentage gains than any of the other high registration states. Each has 24.8 per cent more cars and trucks than last year. Out of the ten states having the highest total registration, four are also in the first ten in percentage gain. These four are Massachusetts, California, New York and Michigan.

New York, which already had 812,031

Georgia	144,226
Tennessee	135,745
Oregon	134,566
South Dakota	125,233
Florida	117,000
West Virginia	112,752
Louisiana	102,284
North Dakota	99,100
South Carolina	95,978
Maine	91,710
Alabama	90,052
District of Columbia	85,425
Arkansas	83,583
Mississippi	76,300
Rhode Island	66,500
Montana	62,649
Idaho	53,900
Utah	49,156
New Hampshire	48,446
Vermont	43,881
Arizona	38,625
Wyoming	30,636
New Mexico	25,473
Delaware	24,500
Nevada	12,647
Total	12,357,376

cars and trucks in 1921, has jumped up 23.2 per cent in 1922. This fact is an interesting commentary on the discussion about a saturation point. When the state already having the largest automobile population in the country still can jump its registration nearly 25 per cent in one year, it isn't sensible to talk seriously about a saturation point.

The large registration gain recorded for 1922 was spread over the entire country. Fourteen states had increases of more than 20 per cent, while all but 12 gained more than 10 per cent. New Mexico had the smallest increase both numerically and proportionately. It just got over the top of the 1921 figure by 770, making its percentage increase 3.1 per cent. Nevada, on the other hand, was 23rd in the percentage gain list with 16.9, despite the fact that it stood third from the bottom of the numerical gain column with 1828.

PERCENTAGE GAIN IN REGISTRATION

Dec. 31, 1921—Dec. 31, 1922

District of Columbia	38.4
Washington	31.2
Louisiana	27.0
California	25.1
Massachusetts	24.7
Arkansas	23.9
New Jersey	23.7
New York	23.2
North Carolina	22.8
Michigan	21.4
Rhode Island	21.0
Kentucky	21.0
Pennsylvania	20.3
West Virginia	20.1
Virginia	19.9
Florida	19.5
Ohio	19.5
Vermont	18.7
Maine	18.3
Indiana	17.9
Illinois	17.3
Mississippi	17.1
Nevada	16.9
Tennessee	16.0
Minnesota	15.8
Maryland	15.6
New Hampshire	15.2
Wyoming	15.1
Delaware	14.4
Oregon	13.7
Wisconsin	13.5
Connecticut	13.4
Missouri	13.1
Oklahoma	12.8
Texas	12.6
Kansas	12.3
Colorado	11.3
Arizona	10.2
Alabama	9.4
Georgia	9.3
Iowa	8.5
Nebraska	7.1
North Dakota	7.0
Montana	6.6
South Carolina	6.0
Idaho	5.1
South Dakota	5.0
Utah	3.4
New Mexico	3.1
Average	17.6

MOTOR AGE'S PICTURE PAGES



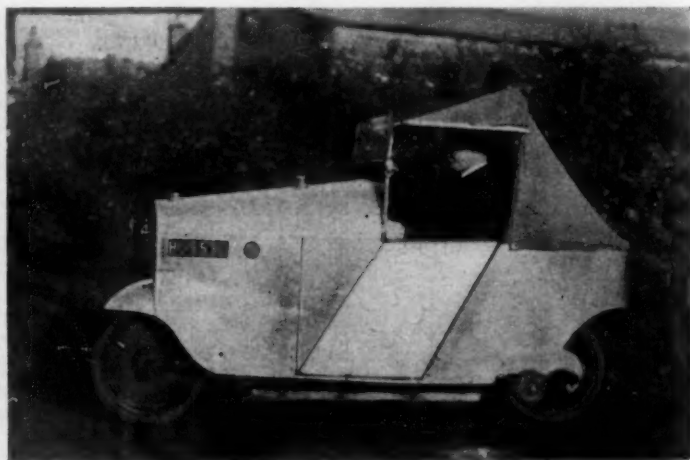
The Boston Elevated Company's new snow loader at work cleaning up Boylston street. There was plenty for it to do after the recent north-easter which swept over New England



Results of Boston's worst blizzard in years, showing the heaped up snow drifts which the storm left in one of Boston's busiest street. The view was taken from Boston Common, on Tremont street, and shows passing automobiles almost concealed by the accumulated snow

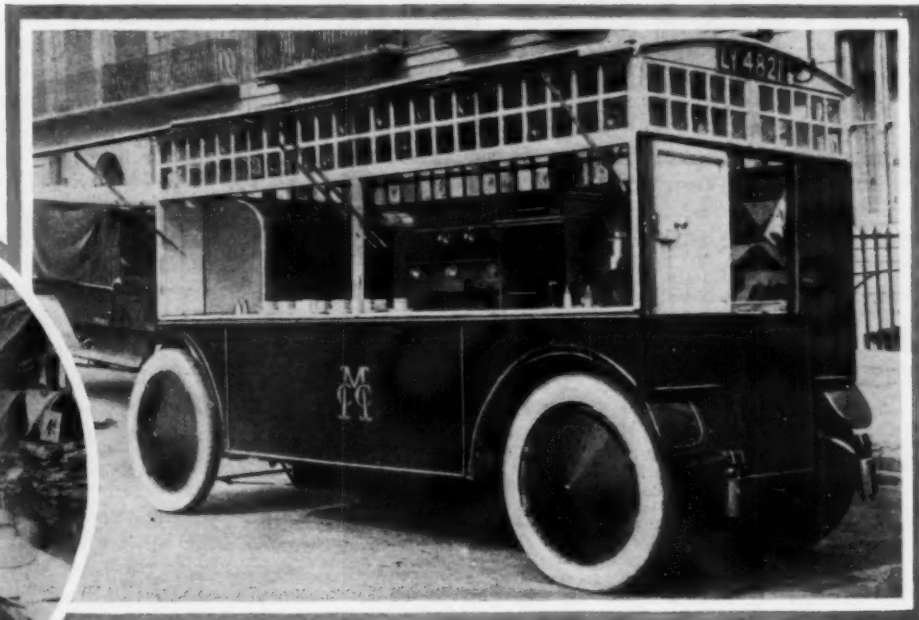


The first automobile caravan to cross the Sahara Desert is shown here at it's first camp, at Tougurt. These cars, fitted with caterpillar treads and sent out by the Citroen company, completed the 2,000 mile trip in 21 days. Three months is required by camel caravans



The new Midget car invented by Mr. A. V. Roe of London is a tiny machine with two wheels, a handle-bar instead of a steering wheel, and an engine that spins it along at a perfectly satisfactory pace. It is so small that it can be driven through an ordinary sized doorway. The car, Mr. Roe and the Roe children are shown above

OF AUTOMOTIVE INTEREST

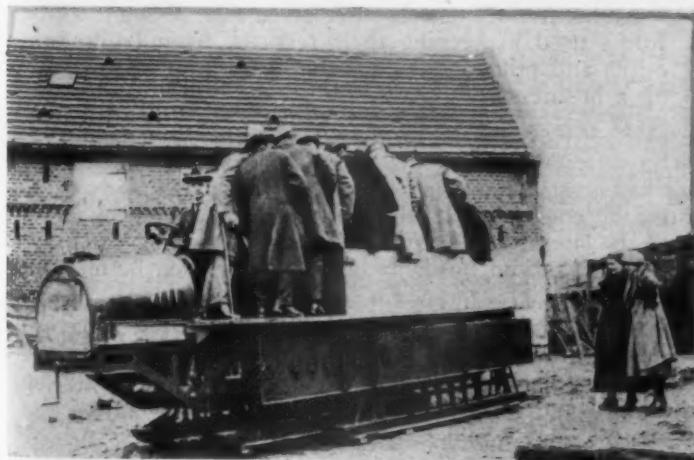


Exit: The London "coffee stall." Enter: A fac-simile of the American lunch wagon. The Reo Speed Wagon shown here with its equipment provides a new way of supplying the hungry at sport gatherings, the sea shore and the like

This interior view gives an idea of how orderly this kitchen on wheels can be kept



At the right, Captain Ariel Vargas, the International News Reel staff photographer in India, is shown riding in a native "taxi"



A new motor truck, recently perfected in Germany, which advances step by step on runners, instead of rolling on wheels. By means of the four runners, which are linked to the steering gear for changing direction, it is able to transport great loads across all kinds of country without regard to road conditions or entire lack of roads

MOTOR AGE

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Specifications and Trends

WE are handing you in this issue of MOTOR AGE information that should be, and will be, very valuable to every automotive dealer in the country, whether he specializes in cars, trucks, tractors, motorcycles, maintenance or accessories. It is on the data included in this number that sales and maintenance are founded.

There are few customers today who do not want some information before he signs on the dotted line and it is not practical to suppose that a salesman can carry all of this information in his head. He needs a book of reference so that he can discuss information with his clients. This information will be found in this issue of MOTOR AGE.

We know of motor car dealers who have tried to gather catalogues of the various lines of cars and to keep them on file for reference. After a painstaking trial, this idea has been given up. Such an effort successfully carried out requires a professional reference clerk to be able to find the information when wanted. In preparing this issue of MOTOR AGE, the experts in classification of information have gathered the statistics that dealers have told us would be most useful to them and have classified it so that any one could find it.

In the main, the text part of this issue is an explanation of the meaning of the statistics. The specifications

would be incomplete without some discussion of them, just as the text dealing with the maintenance features of the 1923 cars would be incomplete without the statistical information.

Just at present, the 1923 specifications data is chiefly useful as a basis of discussion of competing cars on the part of the salesman. Later when these cars begin coming into the maintenance departments and still later when they come into the used car department, this data will be useful to the maintenance manager and the used car manager. When these calls come, the information will be wanted immediately. This issue of MOTOR AGE should be placed in the files where it will be available for such emergencies.

It is a fact, verified by many live dealers, that the older a Specifications Issue becomes, the more valuable it is. It is also a fact that considerable percentage of the questions that reach MOTOR AGE each year from dealers, are answered from these specifications issues. We do not object to answering these inquiries, in fact we are more than glad to render this service, but we cannot but think of the time lost in writing this question, and waiting for the answer, when the questioner could have turned to a back copy of MOTOR AGE and had this information at the moment.



If the prospect wants to talk mechanical specifications, this issue of MOTOR AGE will fortify you.



A Dull Period Task

LETTERS received by MOTOR AGE recently in the discussion of the best show dates agree as to one thing; that January and February are the dull months in the dealer's establishments. We are not entirely convinced that these months should be as dull as most dealers let them be, but that is not the point under discussion at this time.

This editorial contains some suggestions for some very profitable work on the part of the man who concedes that these months are dull and he is going to let them be dull. The suggestions are these:

There are a great many dealers in this country who do not know a whole lot about the maintenance division of their establishments.

Still more dealers have not recently, carefully looked over their establishments for waste space.

And still more dealers have given little thought to the forms used in keeping their records, form letters, receipts and other incidentals that are necessary to make up a business routine.

Here comes the application.

Suppose every dealer who finds time hanging heavy on his hands would take a few hours each day to study carefully the equipment in his maintenance shop, check it up with the latest labor saving and accuracy making machines and see what he needs to make his service better and more profitable.

Then he could look over the space for which he is paying rent and find a place where accessories could be exhibited without adding to rent overhead, where tires could be displayed and sold by employees not now busy all of the time and who would like to earn more money. Added departments lighten the load and increase the income.

The office routine in many otherwise good dealer establishments is simply terrible; both from the point of human interest of the letters and the economy of forms.

This activity would also include a revision of the mailing lists. Imagine the plight of a dealer who, meeting the widow of a former intimate friend on the street, heard her request that he cease to send mail to her dead husband.

All of these things go to make the reputation your establishment has among people generally, and that reputation is well worth building to a proper standard. Why not look well into it between now and when the spring rush begins?



Information, to be of value, must be at hand when needed.



Your 1923 Advertising

IF 1923 is to pass out as has 1922, that is, fulfill all the predictions being made about it, dealers will have to look a little closer into the advertising they are to do. -It is true that the advertising during the past year had a different ring to it, inspired confidence and made friends, but 1923 will need an improvement.

Now is the time to plan and prepare letters, ads and literature—write them if possible and know a little beforehand what you intend to sell in the space you buy in your local paper. Putting advertising effort behind used cars is responsible for many of the remedies for this so-called ill. Maintenance, accessories, tires, gas, new cars, in fact everything automotive will need the force of advertising behind them if 1923 goes down as the banner year.

This is not an advocacy for loads of meaningless copy poured onto the public through the mails and newspapers, rather it is a demand for better, stronger thought in the copy.

The main thing to remember in planning and preparing advertising is this: You are the only one who can do justice both to yourself and your business in its preparation—it is easy for the automotive merchant to write advertising because he is, first of all, a salesman and in advertising you should write to the prospect the same thing you would say to him were you talking to him.



Advertising can create sound opinion only when it is written from the standpoint of facts.



Why We Need Electrical Standardization

"IT'S hard luck," said the man in overalls. "This generator is made especially for your car, and so is the ignition outfit that goes in the end of the generator. I'll have to send away for an armature, some special bearings and spiral gears, but I ought to have them back so you can go on with your trip in about five or six days." The car owner in question had long passed the stage where profanity properly expressed his feelings. He nodded his head in silent assent, and finished his trip by train.

Now at this shop there may have been a number of generators that electrically would have been suitable for the job, but not one chance in a million that they would fit mechanically. Had it been a case of magneto trouble, where mechanical standardization is an accomplished fact, practically any other magneto for the proper number of cylinders would have done the trick. The same degree of standardization is needed for the generator, starter and ignition devices.

That prompt elimination of such difficulties, by small shops as well as large ones, is becoming a factor in the sale of automobiles is being recognized. To this end the

makers of motor cars are working, but until electrical units are more nearly standardized, their efforts are very much hampered.

What does the car owner or the man at the shop care about the number or size of the commutator bars? Even the size of brushes is of secondary importance. The question of whether one machine will go in place of another, however, is of vital interest. Even the question of whether it charges 12 amperes or 17 is not so important to the maintenance man, for either will get by in place of the other in an emergency.

This is a matter that affects the motor car dealer and one in which his co-operation is needed. It is a matter of dollars and sense in both his maintenance, stock and sales departments. Even now the Society of Automotive Engineers and the Automotive Electric Association are working together to determine upon standards that will be helpful to both manufacturers and dealers alike. It is, however, one thing to set a standard and another thing to see that it is followed. At this point the dealer can get in his good work.

Letters to the factory, and talks with the factory representatives should emphasize the need of mechanical standardization. No factory can long proceed against agitation by a large number of dealers, for the dealer is the sales outlet that lets the factory live. Now, all together, let's push for better electrical standardization, AND THE USE OF SUCH STANDARDS, after they are adopted.



The maintenance manager who is puzzled by a new (to him) car that comes into the show can learn many of its secrets from the specification tables.



Sales Contracts

AT the New York Show dealer meetings there was a considerable discussion of dealer contracts and in a number of the factory dealer meetings the contract was made the subject of important talks to the dealers. This is as it should be. A good many dealers are not entirely sold on the conduct of affairs by the factories they represent. Always there are rumors going through the trade that a dealer in a nearby town has been checked out overnight, incurring to him a considerable loss.

Many dealers hear this rumor and lacking positive information, they believe it. For the most part the dealer has nothing except the copy of his contract to check up on. Most dealers do not understand this contract, as it is written in an unfamiliar legal language and may mean many things to him.

Recently some manufacturers have been publishing the high points of their dealer contracts in plain, every day English which the dealers understand and which makes for contentment.

The conversation among dealers on the subject of contracts is changing in its nature. Formerly it was almost entirely confined to pointing out the injustice of the contract. Now dealers are looking for the favorable points and are thus fortifying themselves in the belief that they have an opportunity to build a permanent business.

This change is a good sign, also it means much for the manufacturer who has based his contract on justice to the dealer. It gives to him an opportunity for the discussion on a subject that will be of interest to all dealers and the more justice he can put into that contract, the more alluring it becomes, not only his own dealers but those who are changing lines.

Dealers now-a-days are interested in two primary points: Have the dealers in the line made money and is the contract a fair one?

January Production in Good Volume

Factories Are Maintaining Schedules Set in September

Prospects Bright for a New Record for First Months of Year

NEW YORK, Jan. 22—January operations in automobile plants are proceeding at the rate followed in the early part of December, the lull usually experienced between the holding of the New York and Chicago shows not being apparent. With the month half gone and a large volume of orders booked, the first quarter gives promise of exceeding the output mark of a year ago and of establishing a new record for the period.

In the first three months of last year, 343,823 automobiles were built, January aggregating 51,693, February showing an increase to 109,171 and March mounting to 152,959.

A gain also is expected in the second quarter of the year, production for that period a year ago totaling 692,674 cars with 197,216 manufactured in April, 232,431 in May and 263,027 in June.

Manufacturers are making no predictions beyond the first half of the year and base their expectations on the actual number of orders on hand or in sight. The volume of business already negotiated by parts makers bears out the promise of exceptional activities among car producers.

Keener Competition

The demand for cars will be featured by keener competition than ever before on the part of manufacturer, a competition that will not be confined to any one price class.

Increased operations likewise are anticipated in all branches of the industry, inclusive of trucks and tires.

Tire makers are now engaged in building up a strong reserve against spring demand, with the result that operations have been steadily advancing toward peak production.

With truck builders, the outlook is much more encouraging than a year ago and there is little question but that the first quarter of 1922, with a production of 42,372, will be surpassed and that the second quarter of this year will exceed the 72,114 figure of a year ago.

Truck production has not increased by leaps and bounds but has shown steady and consistent gains, forging ahead only when the demand in the field warranted operations on higher schedules. With general business and industrial conditions showing signs of further improvement, truck builders see a period of greater activity than experienced at any time within the last twelve months, and a promising half year, at least, before them.

Deferred Payments Introduced in France

PARIS, Jan. 6—(By Mail)—With the New Year Citroen inaugurated for the first time in France a system of automobile sales on the deferred payment plan. The conditions are eight per cent interest per annum on the outstanding payments. Thus, for his normal four passenger car, the cash price of which is 13,900 francs, with 10 per cent state luxury tax included, a deposit of 1,000 francs has to be made on placing the order, 2,475 francs on delivery, and 906 frs. 40 c. in 12 monthly installments, making a total of 14,351 frs. 80 c. The same general conditions are offered for all other models, the small 5 h.p. two-seater being procurable on 12 monthly payments of 606 frs. 45 c.

While coming as a surprise, this move on the part of Citroen has met with the approval of the trade in general and even of manufacturers, excepting those in direct competition. Sales on the deferred payment system are common with some of the leading department stores, but had never been taken up by automobile manufacturers.

Fox, Leon Rubay and Benz Among Chicago Salon Entries

CHICAGO, Jan. 22—Germany is to be represented at the Automobile Salon which opens next Saturday at the Drake Hotel, to continue until Feb. 3. The German product will be the Benz car, the latest model of which is said to be a fine example of German post-war design and engineering.

Other high-priced cars entered for the Chicago showing are the following: Cadillac, Cunningham, Daniels, Duesenberg, Fox, Isotta Fraschini, La Fayette, Leon Rubay, Lincoln, Locomobile, Marmon, Minerva, Packard, Rolls-Royce and Winton. Custom coach work exhibits are to be shown by De Causse, Fleetwood and Kimball. This will be the first Chicago showing of the Leon Rubay and the Fox.

Barney Oldfield Resigns as President of Tire Company

CHICAGO, Jan. 19—Barney Oldfield, former race driver, said here today that he resigned several weeks ago as president of the Oldfield Tire Co., the Firestone subsidiary which manufactures the Oldfield tire. He said that although this means his withdrawal from active interest in the tire company he still retains his Firestone stock and that the Oldfield tire will be continued. Oldfield will give his entire attention to the development of his new company, the Barney Oldfield Manufacturing Co., of Los Angeles, which will manufacture the Oldfield die cutter.

Rubber Road Surfacing Is Declared Practical Success

Experimental Section of Paving in Denmark Said to Show Great Durability

WASHINGTON, Jan. 22—The use of rubber as a road surfacing material for highways is declared to be a practical success, based on experiments conducted by a Danish rubber manufacturing company at Koge, Denmark, according to advices received by the U. S. Bureau of Foreign and Domestic Commerce. In reporting on the experiment, Consul Alfred R. Thomson, at Copenhagen, says:

"Directly in front of the factory were prepared two sections of road construction work, each of about 200 meters length. One section of road was covered with tar, the other being covered with a preparation of rubber. After a period of several months it was ascertained, from practical use, that the rubber covered section of the roadway suffered less deterioration than did the tar covered road—the traffic in each case being equal."

The cost of surfacing a well constructed road with this rubber preparation averages 50 cents per square meter, and approximately 15 pounds of the preparation was required for each square meter of road covered. One of the advantages which the rubber preparation is claimed to have with respect to tar substances is that the melting point of the former is 70 deg. Centigrade. It is possible to use for this rubber surfacing material, the report states, large quantities of rubber refuse.

BLACK HILLS DEALERS ORGANIZE

DEADWOOD, S. D., Jan. 22—The Black Hills Automobile Trades Association of South Dakota has been organized by dealers from the cities of Deadwood, Lead, Sturgis and Spearfish. It is affiliated with the Automobile Trade Assn. of South Dakota, which was organized last fall. Officers were elected as follows: President, George H. Kilker, Deadwood; vice-president, R. F. Tackabury, Lead; second vice-president, Roy Skutt, Sturgis; secretary, F. J. Varie, Deadwood; treasurer, C. H. Jenkins, Spearfish. The association will send representatives to the meeting of the state association Feb. 15 at Sioux Falls.

TRUSTEE FOR VOGUE MOTORS

TOLEDO, O., Jan. 20—Judge George E. Schroth of Tiffin has been appointed trustee in bankruptcy for the Vogue Motors Co. of that place. At the meeting of creditors, in charge of Fordyce Belford, referee in bankruptcy, it developed that there were Federal tax claims of \$5,000 and state tax claims of \$2,000 which will almost absorb the proceeds of a sale of the plant.

Continental Motors Profits \$1,560,944 in Last Fiscal Year

Unfilled Orders on Hand Said to Be Greater Than in Any Previous Year

DETROIT, Jan. 19—Net profits of \$1,560,944.57 by Continental Motors Corp. in the fiscal year ending Oct. 31, 1922, were made in the face of large losses in the early months of the year, and indicate the remarkable transformation of business between the first and latter months, President R. W. Judson notes in his annual report to stockholders issued this week.

The addition of this figure, less Federal taxes, brings the surplus of the company to \$6,106,926.33. Cash in banks and on hand is \$1,258,915.31, and total current assets \$10,308,680.09. Inventories of raw and worked material is \$7,800,653.18, a reduction of \$613,868.45, according to Judson, which is declared satisfactory considering that a proportionately larger inventory is necessary to meet increased manufacturing schedules.

The schedule for the present year is 350 per cent greater than a year ago, Judson notes, and volume of unfilled orders far exceeds any previous year in the history of the corporation. In the year past, truck engine business was two and a half times greater than the previous year, he said, and though this is far below normal, it is steadily and consistently increasing with the return of good business generally.

Value of sales orders on the books Oct. 31 was \$54,000,000, or 39 per cent more than at the close of the previous year, notwithstanding lower prices. The report notes that there are 60 main service stations handling distribution of genuine parts, and these will be increased to 300 as business improves. Since the compilation of the balance sheet, the corporation paid off all bank indebtedness, shown as \$1,450,000.

100 Dealers Entertained By Financing Company

SOUTH BEND, Ind., Jan. 21.—The Associates Investment Co. of this city entertained more than 100 motor car dealers, for whom this company handles the time payment paper, at a dinner at the Oliver Hotel last night. R. E. Fair, a Ford dealer at Kalamazoo, was toastmaster and the speakers were Dr. M. W. Franklin of the General Motors Corp. Advisory Committee, H. D. McClelland of the Indiana Secretary of State's office, and Clyde Jennings, editor of MOTOR AGE. Dr. Franklin spoke chiefly on maintenance, which he is now investigating, but he made the interesting announcement that the General Motors participation in the financing feature of automobiles was begun chiefly with a view of establishing an experience table and blazing the way. McClelland talked ex-

clusively on the title feature of the Indiana registration law. Jennings' subject was "Stop the Turnover." H. J. Cooper, a Dodge dealer at Kalamazoo, told some entertaining experiences of moose hunting.

Fords Were Nearly Half of 2,576,219 Production in 1922

NEW YORK, Jan. 19—It is interesting to note that of the 2,576,219 motor cars and trucks made in 1922 that 1,232,112 were Fords, while Ford's production in December totaled 115,629 of the month's count of 225,000. The decrease under November is 5 per cent and December, 1921, decreased 35 per cent under November. The increase of December, 1922 over December, 1921, was 200 per cent. Following is the table of monthly production figures for 1922:

January	91,100
February	122,366
March	172,720
April	219,558
May	256,219
June	289,011
July	245,414
August	273,425
September	205,784
October	238,514
November	235,854
December	225,000

PACKARD SELLS BRANCH

DETROIT, Jan. 22—Closely following the disposal of its St. Louis branch to the Berry Motor Car Co., Packard Motor Car Co. has sold its Kansas City branch to the newly organized Reid-Stith Motor Co. The officers of the new company are R. W. Reid, who was formerly Chicago branch manager of the Burroughs Adding Machine Co., and M. C. Stith, formerly general sales manager of Burroughs at the Detroit factory.

R. B. Mann, who was branch manager at St. Louis, will become branch manager at Detroit, and H. W. Peters, Detroit manager, will become branch manager at Chicago, succeeding to the place vacated by the resignation of C. G. Embleton. The Packard company will continue its remaining four branches, those beside Detroit and Chicago being New York and Philadelphia.

MIDWEST RUBBER MEETING

Chicago, Jan. 19—The fourth annual meeting of the Midwest Rubber Manufacturers' Assn. will be held at the Hotel Morrison, Chicago, Jan. 30, at 3 p. m. Directors will be elected. A banquet will be held in the evening. W. W. Wuchter, of Omaha, is president of the association and C. S. Sutherland is general manager. Headquarters are in Chicago.

68 PER CENT CLOSED CARS

SYRACUSE, N. Y., Jan. 20—The sales department of the Franklin Automobile Co. has compiled statistics showing that last year 68 per cent of Franklin shipments were closed cars. This was an increase of 16 per cent over the preceding year.

N.A.C.C. Advertising Managers Complete Show Week Program

E. S. Jordan Will Be Chairman of Meeting to Be Held at University Club

NEW YORK, Jan. 20—The program for the session of advertising men, called by the advertising committee of the National Automobile Chamber of Commerce, has been completed. The meeting will be presided over by Chairman E. S. Jordan and held at the University Club in Chicago Monday and Tuesday of show week.

The morning session on Monday will be devoted to passenger car subjects, including discussions on: Distribution of advertising costs in different local media between distributor and factory; how can consumer media be tested; how can results of dealers' campaigns be tested; how can the factory help the dealer sell used cars by advertising. In the afternoon the discussion will be on house organs, export advertising, what constitutes news and how can the N. A. C. C. and the respective advertising departments of the members be of increased helpfulness to each other.

Tuesday morning will be given over largely to the truck interests. In the morning the advertising men will talk on the division of advertising costs, checking national media, dealer helps and direct mail efforts, advertising of motor busses and house organs. In the afternoon one of the questions will be, Should a company making a number of models advertise all in each piece of copy or plan a diversified campaign? There also will be a discussion of advertising media other than national consumer publications and what are the best methods and uses of statistical research in relation to advertising.

DIAMOND T SALES DOUBLED

CHICAGO, Jan. 22—Sales of the Diamond T Motor Car Co., truck manufacturers, in 1922 were more than double the sales of 1921, according to C. A. Tilt, president of the company.

"Present indications," Tilt said, "are that we will double our 1922 business this year. January so far is proving a most satisfactory month. At the rate orders are coming in we look for the largest January in the Diamond T company's history." Tilt added that material and parts deliveries were not as prompt as desired and that there were indications of higher costs which might be reflected in the retail price lists of trucks.

PREMIER SALE POSTPONED

INDIANAPOLIS, Jan. 19—Receiver's sale of the Premier Motors Corp. was again postponed by Superior Judge Linn D. Hay here today at the request of the receiver and the creditors' committee. It is said that the committee and the Fletcher Savings and Trust Co., receiver, have virtually agreed on a plan whereby the committee would take over the plant and operate it as a going concern.

Sales Count for Good Strokes in Dealer's Golf Game Contest for Automobile Salesmen

Progress Marked Daily on Canvas Course—Prizes of Golf Equipment Await First to Reach Each Hole After the Ninth

DETROIT, Jan. 22—Ford Motor Co. likes the plan the Hugh Baird organization, Seattle, has adopted to stimulate the activities of salesmen in the sale of all sorts of Ford products from touring cars to Dearborn Independents.

The plan presents something new in sales contests which begins the first of each month and in which each salesman becomes a golf player,—the playing, however, being done on a painted canvas with all the good strokes being credited for sales. Photographs of the head of each salesman in golf ball size, line up at the first tee at the start of the month. Yardages for sales are allowed as follows:

- 100 yards for a touring car sale.
- 150 yards for a roadster sale.
- 200 yards for a coupe sale.
- 200 yards for a chassis sale.
- 300 yards for a sedan sale.
- 400 yards for a truck sale.
- 600 yards for a tractor sale.

Distances on the canvas are laid out according to the distances on the Jefferson Park municipal links, Seattle, and vary from hole to hole. Salesmen making first sales have their photographs advanced according to the yardage the sale merits. Arriving at the green he must

sell a subscription to the Dearborn Independent before he can hole out, but is allowed any excess yardage he may have made on the hole on the fairway to the next.

Arriving at the ninth hole he receives his first award, a golf bag. On the eleventh hole he receives a steel-shaft mid-iron; thirteenth hole a steel shaft driver; fifteenth hole a steel shaft mashie; sixteenth hole a steel shaft brassie and on the eighteenth hole a putter, or the equivalent to the whole set of clubs and prizes in cash.

On the thirteenth hole he has a lake to cross about 100 yards from the tee. It is impossible to cross the lake without the sale of a truck. Any yardage from other sales is lost on the thirteenth until he obtains a truck order.

Cancellations result in a man being out of bounds and to regain his position on the fairway he must make an extra sale.

The reason for not allowing prizes up to the ninth hole is to eliminate the chances of a new salesman stepping in and out, not having finished the entire game. The game is reported as creating unusual interest among salesmen.

Chicago Dealers Optimistic; Look for Banner Year in '23

CHICAGO, Jan. 22—Dealers on "the row" and in the south section of the city report sales somewhat slower than in December. This, they believe, is due to the fact that the public is awaiting the show to see all of the 1923 models.

This does not mean that sales are not stepping along at record pace for this time of the year, Tennant Bros., automobile bankers, reporting unusual business. Maintenance work this winter has kept a great number of the shops in the city at capacity and many dealers are already preparing for the spring rush in this department.

Every automotive merchant interviewed is sure that 1923 will surpass '22 and to this end are preparing to work at top speed from show time on. Many new and novel merchandising plans have been devised and will be put to work immediately. There is every indication that automotive advertising this year will be another feather in the cap of the industry.

INDIANAPOLIS RACE SANCTIONED

WASHINGTON, Jan. 22—The contest board of the American Automobile Association, under which racing is conducted at most of the American speedways, announces that it has granted a sanction to the Indianapolis Speedway for the 1923

International Sweepstakes on May 30. Entry blanks for this race have been prepared and are not ready for distribution, it is announced.

William Schimpf, chairman of the Contest Board, said that an engraved certificate and a gold medal emblematic of the American speedway championship for 1922 are being prepared for presentation to Jimmy Murphy, winner of the honor. Schimpf has started on a trip to the Pacific Coast.

VANE ADDRESSES BUREAU

DES MOINES, Ia., Jan. 22—C. A. Vane, general manager of the National Automobile Dealers' Association, addressed the annual meeting of the Motor Trades Bureau here and urged a higher standard of business methods and ethics in the motor car business.

Vane suggested that factory training of mechanics will supplant the present methods of getting this class of employees and stated that greater care and training should also be used in the choice of salesmen. He stated that poor business methods such as mismanagement and too high prices allowed on used cars were responsible for a large number of the failures in the business during 1922.

He urged motor car dealers to look after their own interests just as other classes of business do and among other things suggested active participation in movements for improved highways and against excessive excise taxes.

Roads Congress Forecasts Great Highway Development

Thousands of Delegates at Chicago Meeting Plan Roads to Meet Automotive Needs

CHICAGO, Jan. 20—Intense interest in highway improvement throughout the United States was indicated by the large and representative attendance at the good roads show and convention of the American Road Builders' Assn. here this week. The growing and satisfactory use of automobiles on such roads as have been improved has, of course, stimulated highway enthusiasm and has greatly influenced the sentiment for wider roads and more uniform traffic regulation which was evident among the thousands of delegates.

The road show at the Coliseum included a large display of automotive equipment used in road construction, including trucks and tractors. Various types of dump bodies were shown mounted on some of the best known makes of trucks. Gasoline engines of the automobile truck type also were shown installed in various grading, mixing and paving machines.

A notable exhibit was that of the United States Bureau of Public Roads in which various types of road pavement were shown by miniature models. This exhibit also included many of the machines and devices used by the bureau in testing various types of road surfaces. A chart showed the distribution by states of the 23,000 miles of Federal aid highways which have been completed. Another map showed that "if Chicago were Rome" the Federal aid mileage would be sufficient for an individual highway from each of 21 coast or border cities to Chicago.

State highway departments which had interesting exhibits were those of Illinois, Wisconsin, North Carolina, New Jersey and Georgia. Maps and other exhibits in these booths showed that in the development of state highway systems a distinct appeal is being made to interstate automotive transportation as well as to the conveniences of local communities. It was apparent that highway programs contemplated would provide for vast expansion of motor vehicle transportation.

The convention program included addresses by a number of notable highway engineers and commissioners, among them being Thomas J. Wasser, highway engineer of New Jersey and president of the association; C. M. Upham, state highway engineer of North Carolina; Clifford Older, state highway engineer of Illinois; A. T. Goldbeck, engineer of tests, U. S. Bureau of Public Roads; John H. Mullen, chief engineer Minnesota highway department; B. H. Piepmeyer, state highway engineer of Missouri; A. R. Hirst, state highway engineer of Wisconsin.

More Companionship Than Lunch



NEW YORK, Jan. 19—While the automobile show was in progress last week W. C. Durant, head of the Durant enterprises, and J. D. Dort, president of the Dort Motor Car Co., renewed associations of 37 years ago by lunching together in a Thompson restaurant in Columbus Circle. In the photograph Durant is at the reader's left and Dort at the right. The two men were in business together 37 years ago when their office was in the corner of a workshop, with a pine board for a desk and nail kegs for chairs. On this occasion Durant ate ham and beans, bread and coffee, and Dort ate beans, rice pudding, bread and coffee.

Dort Discontinues Branch in New York; to Add Dealers

NEW YORK, Jan. 22—A change in distributing policy pertaining only to New York City and the Metropolitan district is announced by the Dort Motor Car Co., which is discontinuing its retail salesroom at 1872 Broadway. Under the new scheme, the entire Eastern Atlantic district, including the New York metropolitan area, will be handled in a wholesale way by District Manager C. R. Teaboldt, from the service station at Broadway and 132nd street. Six or eight more retail dealers will be appointed in this section in addition to the ones already in Brooklyn, the Bronx, Bayonne, N. J., and Newark. The New York branch was established three years ago and was the only Dort branch in the country. The company was not at all favorable to the branch idea from the start, and discovered after three years' operation that in at least 70 per cent of the retail sales made by the branch, it had to pay encroachment fees to its regularly appointed retailers. So it was decided to get out of Manhattan in a retail way. The Dort company elsewhere will continue under its old policy, having sixty distributors and 2000 dealers throughout the country.

ELIZABETH PLANT DEDICATED

NEW YORK, Jan. 18—Formal dedication of the huge Durant plant at Elizabeth, N. J., was one of the events of show week. The dealers were taken to the plant on Tuesday and the next day the dedication took place, with leading officials of Durant Motors and its subsidiaries and many invited guests participating. W. C. Durant and F. W. Hohensee were the guests of honor, the latter being president and general manager of the Durant Motor Co. of New York and slated for the presidency of the New Jersey company. Wednesday was the thirty-sixth anniversary of his affiliation with Durant and so he was the hero of the occasion.

DEALERS ATTEND MEET

DAVENPORT, Iowa, Jan. 19—Charles Alford, manager of the Davenport retail branch of the Willys-Knight and Overland cars, was host to 40 dealers in 30 counties in eastern Iowa and Western Illinois. Business campaigns during the year and trade problems were discussed in the one-day conference. The model 6-44 is built and tested. The film stirred the dealers to enthusiasm and President George H. Hannum and Sales Manager C. J. Nephler, who are responsible for this automobile movie, felt well repaid for the work they had done on it.

Detroit December Sales Show Preponderance of Closed Cars

Business for the Month Exceeded That of November by About 25 Per Cent

DETROIT, Jan. 22—Retail sales of new cars in Detroit during December exceeded November by about 25 per cent, according to tabulations by the Detroit Automobile Dealers' Association. Truck business in December in trucks of all classifications exceeded November by upwards of 20 per cent. In cars and trucks the sales totals for the month were 2551 and 347, respectively.

Of the total passenger car business, Ford had 1148 sales and in trucks the Ford total was 241. Closed Ford business exceeded open models 608 to 540. Chevrolet business ran second to Ford in volume, with 387 sales, 174 open and 213 closed. In the middle and high priced cars the figures ran heavily in favor of closed cars, the total of all business being three-fifths closed to two-fifths open.

Figures on Hudson-Essex business show that on Hudson the closed sales totaled 60 to 4 open. On Essex the closed total was 51 to 2 open. This represented the largest preponderance of closed cars over open, although in the high priced lines the choice was almost as one-sided. In trucks aside from Ford the choice was about evenly divided between light delivery and heavy duty vehicles.

WINNIPEG TO HAVE SHOW

WINNIPEG, Man., Jan. 19—Winnipeg is to have a real motor show. For several years it has not been thought feasible to hold such an exhibition, although its advantages have been apparent, primarily because of the absence of a building large enough and suitable for the adequate display of a commodity of such a character. It was decided this year by the executives of the Motor Trades Assn. that Minto barracks held promise of being the best location under the circumstances, and steps were immediately taken to secure these premises. Through the courtesy of the military authorities the armory has now been placed at the disposal of the motor trades for the event, which is scheduled for the week of Feb. 5 to 10.

ACME REPORTS GAINS

CADILLAC, Mich., Jan. 20—At a sales convention of district representatives and branch managers of the Acme Motor Truck Corp. here last week it was announced that the company's sales of motor trucks in 1922 increased 66 2/3 per cent over the sales for 1921. Still further increases this year were forecast from composite reports of the representatives concerning the outlook in their respective territories. It was announced that factory plans have been made to increase production from 40 to 80 trucks a month.

M.V.C.C. Prepares for Flood of Automobile Legislation

Seek Uniform State Laws; Pamphlet Sent to State Subcommittees for Help

NEW YORK, Jan. 20—Preparing for a flood of automobile legislation this year, when most of the state legislatures will be in session, the Motor Vehicle Conference Committee, representing the National Automobile Chamber of Commerce, Motor and Accessory Manufacturers Assn., Rubber Assn. of America, National Automobile Dealers Assn. and American Automobile Assn., has prepared ammunition for its state subcommittees and for the legislators themselves which it hopes will be a guide for law making that will be uniformly fair.

This is contained in a pamphlet which not only gives a digest of the state laws now in force and suggestions for uniform state laws, but also advances the committee's views on what is a sound basis for the enactment of unbiased measures. In this section come size restrictions, weight restrictions, speed restrictions, special permits to raise restrictions, special permits to lower restrictions and local powers. In each the committee endeavors to give facts for the guidance of law makers.

Realizing that it is necessary to impose size, weight and speed limitations upon motor vehicle use for the protection of the highway as well as vehicular and pedestrian movement, the committee believes that there is a happy medium between those two opposing factions, one of which claims that dimensions, weights and speeds of motor vehicles and their loads be reduced to the capacity of the weakest highways, and the other which insists that the roads be built to stand the biggest, heaviest and swiftest loads the users of motor vehicles desire to place upon the highways. So it makes the following suggestions:

Size Restrictions

1. Width, including load, 96 in. (Tractor engines 108 in.)
2. Height, including load, 12 ft. 6 in.
3. Length, including load: (a) Single vehicle, 30 ft. (b) Combination of vehicles, 85 ft.

Note—From the foregoing it is apparent that in order to admit of the safe passage of two vehicles each of which with its load is 96 in. wide, a highway at least 20 ft. in width is desirable.

Weight Restrictions

1. Single vehicular unit of four wheels or less (tractors and semi-trailers to be regarded as separate units) 28,000 lbs.
2. Any one axle of the vehicle or any additional axles of semi-trailers or trailers, 22,400 lbs.
3. Per inch width of tire measured between flanges of the rim in case of solid rubber tires.

Size of Tire	Load Per Inch (Maximum)
3 in.	400 lbs.
3½ in.	400 lbs.
4 in.	500 lbs.
5 in.	600 lbs.
6 in.	700 lbs.
7 in.	750 lbs.
8 in.	800 lbs.
10 in.	800 lbs.
12 in.	800 lbs.
14 in.	800 lbs.

4. Minimum thickness of rubber for solid rubber tires:

3 in., 3½ in., 4 in., 5 in. tires....	¾ in.
6 in., 7 in., 8 in. tires.....	1 in.
10 in., 12 in., 14 in. tires.....	1½ in.

Speed Restrictions

In the matter of speed restrictions no motor vehicle should be operated upon a public highway at a rate of speed greater than is reasonable and proper, having regard to the traffic and use of the highway, or so as to endanger the life or limb of any person or the safety of any property, and should not in any event while upon an urban street run at a rate of speed greater than 15 miles per hour; upon a suburban street at a rate of speed greater than 20 miles per hour, or upon any other street or highway at a speed greater than 30 miles per hour.

Note—The laws of many states and the proposed Uniform Vehicle Law prescribe for the three types of thoroughfares indicated a graduated schedule of speed limits based on the kind of tire equipment of the vehicle and its gross weight. Such elaborate and detailed schedules, however, are very difficult to enforce.

Special Permits to Raise Restrictions

There are, of course, times when it is imperative on certain highways or portions thereof that the movement of vehicles bigger and heavier than those allowed by law be permitted.

To meet such situations—which should be the rare exception rather than the rule—the state, county or municipality exercising jurisdiction over roads and bridges should be empowered under definite limitations to grant written permits for the movement of restricted vehicles to meet emergency conditions.

Special Permits to Lower Restrictions

To deal with bad frost or other similar conditions where it is essential to lower the weight or speed restrictions ordinarily enforced, the power of the state, as centralized in its highway departments or the county or local highway authorities, after consultation with and permission from the State Highway Department, should have power to reduce the weight or speed restrictions to points deemed essential to the preservation of highways or the safeguarding of travel.

In all such cases, however, there should be public hearings on the subject; due notice of the reduced restrictions should be given to the traveling public and the highways or portions thereof affected should be properly posted.

From the nature of the case, size restrictions on the vehicle of course can never be reduced.

Local Powers

Except as indicated, the subordinate political subdivisions of the state, such as counties, cities, towns, boroughs, townships, etc., should have absolutely no power to prescribe size, weight or speed restrictions at variance with those allowed for the state as a whole. The need for such limitations on local governing bodies is too obvious to require discussion.

SENATE PASSES P. O. BILL

WASHINGTON, Jan. 19—The Senate, without a record vote, passed the Post Office Department Appropriation bill, which carried with it a sum of \$14,500,000 for automotive and vehicle allowance, and which was cut \$500,000 from the original sum of \$15,000,000 after charges had been made by Senator McKellar, that the automotive division of the Post Office had been extravagant in the moneys handled by it for automobile transportation of the mails.

The growth of the motor-vehicle service in the Post Office was shown by Senator McKellar, who presented figures showing that the number of motorized cities had grown from 10 in 1917, using 541 trucks, to 347 cities on July 1, 1922, using 4,433 trucks.

Rubber Restriction Act Up For Discussion by Tire Men

British Growers' Representatives Come to U. S. to Meet Rubber Association Men

NEW YORK, Jan. 22—Plans for the meeting of committees representing the Rubber Association of America and the Rubber Growers' Association of London, which will discuss the British restriction act and its effect upon the American industry, are being made. The English committee of three is due to reach New York this week and the joint session will start at once, for the visitors are due to sail for home on Feb. 10. The sessions will be held in New York, but a trip to Akron is scheduled during the visitors' stay here.

The British restriction act will be discussed from all angles and its importance to the American rubber industry is shown by the request of Secretary Hoover of the Department of Commerce that he be kept advised as to the discussions and actions of the committees.

In preparation for the meeting the Rubber Association of America has compiled statistics from a special questionnaire sent out by the association on Dec. 1 and which was answered by 341 American and sixteen Canadian manufacturers, representing 95 per cent of the industry.

The questionnaire was taken on the consumption of crude and reclaimed rubber in this country for the last four years and disclosed the fact that 1922 was a record year, in that the total quantity of crude rubber consumed for all purposes in that period was 283,271 long tons, counting both the United States and Canada. Of this between 75 and 80 per cent went to the tire manufacturers. In 1921 the total was 169,308; 1920, 196,270 and 1919, 202,303. This includes both plantation rubber and all others.

An inventory of the crude rubber in the United States and afloat for United States ports on Oct. 31, 1922, showed 84,982 long tons on hand and 43,514 afloat. In this inventory was included 341 American manufacturers, sixteen Canadian and thirty-eight American importers and dealers.

NASH ORDERS BIG

KENOSHA, Wis., Jan. 19—Nash Motors on Jan. 9 had on hand more orders for delivery this month than were booked in any previous month in the history of the company with the exception of May and June of last year. Total sales of Nash passenger cars in 1922 more than doubled shipments made the previous year. One interesting phase of the 1922 record is that the last six months of the year eclipsed the first half in point of sales. In other words, 1,005 more cars were shipped by the factory from July 1 to Dec. 31 than were shipped between Jan. 1 and June 30, which period included of course, the natural spring demand.

Business Followed These Salesmen to Their Factory Convention



BALTIMORE, Md., Jan. 20—The entire sales force of Black & Decker Mfg. Co., with the exception of the Pacific Coast contingent, assembled here early this month for a three-day convention, at which time the above photograph was made. At the close of the conven-

tion the company announced that during the three days, with practically the entire sales organization out of the field, orders totaling \$60,000 came in by telephone, telegraph and mail, which is a good indication of how these folks keep things "pepped up".

Many New England Men Attend the New York Show

BOSTON, Jan. 19—New England in general, and Boston in particular, was more widely represented at the New York automobile show than ever before. And the dealers and salesmen went earlier and stayed longer. Every Boston dealer had at least two or three salesmen along, and the Jeffrey-Nichols Company, started a record by having 13 in its party comprising men from sales, service and executive departments.

They all seemed quite enthusiastic while at New York, and those who got back early were on the job hustling in order to get the benefit of what was in the air—optimism and business. That the Boston dealers will stock cars now seems a certainty, for the impressions of New York seemed to mean a big year in 1923, but with lots of competition. So they are getting ready for it.

As a result of the show there will be some new agencies announced shortly. The Connell & McKone Company has already made its announcement. It has taken on the Flint. This company handled Overland until it sold out a year ago. Ever since the two men have been looking for something worth while and they had 15 cars offered them in that time. They kept their firm intact ready for any opening, and now they will start off with the Flint, which will be exhibited at the Boston show.

FRANKLIN DEALERS DINNER

NEW YORK, Jan. 18—Five hundred Franklin dealers were guests of the company at a dinner and business meeting in the Commodore Wednesday at which speeches were made by S. E. Ackerman, sales manager of the company, and S. R. Latshaw, a vice-president of the Butterick Co. A cablegram from H. H. Franklin was read in which he expressed his regrets at his inability to attend and

extended his best wishes for business in 1923.

Ackerman said the factory was prepared to give dealers all the cars their territories required, and said within a brief period production would be at the rate of one car every ten minutes in each working day. Latshaw addressed the dealers on the necessity of capitalizing the advertising given the Franklin in each of their territories. As a result of advertising, he said, many persons everywhere were already sold from 20 to 80 per cent on Franklins and all that remained was for them to realize this and complete the transaction.

CLEVELAND SHOW, JAN. 20

CLEVELAND, Jan. 19—Cleveland's largest automobile show will open in the public auditorium and central armory Saturday, Jan. 20.

Herbert Buckman, manager of the Manufacturers and Dealers Assn., says that the exhibit will be marked by more displays and a greater variety of products than has characterized similar shows here. With both dealers and manufacturers looking forward to even a

QUINCY SHOW DATE

QUINCY, Ill., Jan. 18—The Quincy Automobile Trades Assoc. has decided to stage an automobile show in the Armory March 28 to April 1, but will confine its exhibits to passenger cars, accessories and tools and equipment.

Walter Ebbert was selected to succeed A. L. Stewart as head of the tire bureau of the association.

260 STARS; 60 DURANTS DAILY

DETROIT, Jan. 15—Durant Motor Co. of Michigan is entering upon a schedule of 260 Star cars and 60 Durant fours daily, an increase over recent output of about 25 per cent. The company has been somewhat retarded by delays in body deliveries but these are now coming

Dunlop Company Ready to Go Ahead, Says Edw. B. Germain

BUFFALO, N. Y., Jan. 22—The expansion program of the Dunlop Tire & Rubber Corp., of America, will go along without a hitch, Edward B. Germain, president of the company said today in discussing the future of the mammoth River Road plant. Fully 10,000 persons, at least one-third of them women, will be employed in the plant when it is running at peak.

"We are going to grow gradually," said Germain. "We have a very definite program and will carry it out. We could begin to turn out tires in this plant tomorrow, but we will not market a single Dunlop tire until we have thoroughly convinced ourselves that it measures up to the high standard always enjoyed by Dunlop. Our plant will turn out only cord tires.

"Now as to our sales policy. We are not going to try to sell the whole 48 states at one time, but are going to gradually reach out from the Buffalo district. We first want to sell Buffalo people, our own community, our product. When we are satisfied that we have established our tires in one territory, we will step into another.

"We will not attempt to establish a nation-wide market, until we have put our plant in such a shape that it will handle any volume of sales. When we attain maximum production, our daily output will be 14,500 tires. Of these 1,000 will be solid tires and 1,000 will be giant tires. We expect to employ 2000 persons by next January.

HEWITT TIRE PRICES UP

BUFFALO, N. Y., Jan. 22—Hewitt Rubber Co. has increased tire prices approximately 12½ per cent on cords, 10 per cent on fabrics, 5 per cent on Ford size gray tubes and 15 per cent on all other tubes.

Reductions Sought in Army Motor Transportation in 1924

\$1,536,000 Asked by War Department Against \$1,948,398 in 1923

WASHINGTON, Jan. 18—Reduction in the amount of appropriations for motor transportation of the army is recommended in the War Department Appropriation Bill for the fiscal year 1924, reported from the House Appropriations Committee. The House Committee decreased the Budget Bureau estimate by \$817,074 for all forms of army transportation, making the total amount \$15,500,000, or \$1,500,000 under the 1923 appropriations for this branch of the Quartermaster Corps. The committee recommended appropriations aggregating \$319,773,979.28 for the War Department for the next fiscal year.

The estimates of the War Department for motor transportation were considerably less than last year. The army asked Congress for \$1,536,000 for all motor transportation as compared with \$1,948,398 for 1923. The estimate for repairs to motor trucks and trailers for 1924 was \$396,710 as against an appropriation of \$524,474 for 1923. Army officers explained this reduction by the fact that hundreds of cars had been disposed of during the last year.

The Quartermaster Corps also asked Congress for \$236,000 for gasoline and lubricating oils used in the operation of tanks and tractors belonging to the artillery.

1778 is Net Reduction

There is a net reduction of 1,778 in the number of motor vehicles to be operated by the Department next year. According to the testimony of General Dalton, Assistant to the Quartermaster General of the army, the number of automobiles to be operated in 1924 is 753, as against 1,104 in 1923, showing a reduction of 351. The number of cargo trucks to be operated in 1924 is 2,162 as against 3,176 in 1923, showing a reduction of 1,014. The number of motorcycles to be operated in 1924 is 873, as against 1,286 in 1923, making a reduction of 413. The reduction in each of those items figures out approximately 32 per cent.

The army appropriation bill also contains an item of \$169,000 for the purchase, manufacture, test, maintenance and repair of tanks and other self-propelled armored vehicles for the Ordnance Department.

The War Department has advised the House Appropriations Committee that on Oct. 1, there were 1,858 automobiles, 7,595 trucks and 4,987 special and technical vehicles in the hands of troops. There are no surplus vehicles, the War Department says, except special and technical apparatus for which the Government could get very little if they sold them and as a consequence has decided to retain these vehicles. According to the War Department they have procured about 15 or 20 per cent of the total

value of motor vehicles sold or turned over to government departments. The War Department sold 26,833 motor vehicles for which it received \$3,239,173.

Only Pessimist Would Look at 1923 as Unfavorable: Rice

NEW YORK, Jan. 19—Before leaving New York, following the closing of the show, H. H. Rice, president of the Cadillac Motor Car Co., declared that one would indeed be a pessimist who could not look forward to further advances in the automobile industry in 1923. The future can be determined by three factors, he says—accomplishments of the industry itself, general business conditions and orders from distributing organizations.

"Considering basic industries and general conditions as they affect the automotive industry, we can leap to the center of the situation by stating that orders for steel and iron placed with the big mills of the east by the motor car manufacturers indicate that they are expecting a record year," said Rice.

"As a result of our latest market analysis in which reports from the field and orders for months ahead have been factors, we have again had to revise our production schedule upward, as we have done time and again in the past twelve months. New men are being added to our manufacturing forces, new equipment installed, and our production schedule calls for continued increases for many months."

CHAIN STORES BANKRUPT

MILWAUKEE, Wis., Jan. 20—Following the granting of a judgment for \$12,820.40 in favor of the Ajax Rubber Co., the United Consumers Corp., of Milwaukee, with about 4000 stockholders and a chain of automotive equipment stores and filling stations throughout Wisconsin, has been placed in the hands of a receiver. It is one of the largest cooperative enterprises in the Wisconsin trade. Herbert J. Peterson of Sturgeon Bay, banker and president of the corporation, was appointed receiver, but on objections of stockholders, he was removed and Julius J. Goetz, 1910 St. Paul avenue, Milwaukee, substituted. The concern was organized in 1920 by Homer E. Rose, now living in California, and built up a chain of 57 filling stations and 42 storage stations. Liabilities are variously stated to be \$180,000 to \$300,000 and assets of about \$600,000 are claimed. The Western Petroleum Co. has a claim of \$71,000.

FORD DEALERS MEET

ROCKFORD, Ill., Jan. 19—Ford dealers and salesmen to the number of 175, representing the trade area within 35-mile radius of this city, attended annual meeting of the dealers as guests of the Ford Motor Co. last week. Frank Doubet, manager of the Ford branches in this territory, presided and H. E. Merritt and V. P. Minnick of the Chicago agency attended. T. D. Costello spoke upon the value of an aggressive advertising campaign through newspaper and direct mail.

Tarkington Units To Be Made in Rockford Plants

P. A. Peterson, C. E. Swenson and Levin Faust Are on Officer's Roster

ROCKFORD, Ill., Jan. 22—At the head of the Tarkington Motor Car Co., which will announce the new Tarkington car in the \$2500 class at Chicago next week, is P. A. Peterson, president of the Mechanics Machine Co. and the Rockford Drop Forge Co. of Rockford. Peterson also is heavily interested in a number of other Rockford concerns.

The secretary of the company is C. E. Swenson, vice-president of the Rockford Drilling Machine Co., and a stockholder in a number of other concerns. The treasurer is Levin Faust, treasurer of the Mechanics Machine Co. and secretary and treasurer of the Rockford Drop Forge Co. He is also vice-president of the Rockford Tool Co. The factory manager is J. A. Tarkington, who has been connected in the past with the Apperson and Kissel companies. The general sales manager is C. B. Williamson.

The company will manufacture one chassis with a full line of open and closed bodies. Many of the units will be manufactured by the various metal working plants owned and managed by the officers of the company. These concerns have long been engaged in the manufacture of automotive parts which have been widely marketed. Some units will be purchased. A new plant will be utilized for assembly.

CLOSED CAR WEEK AT FT. WORTH

FORT WORTH, Tex., Jan. 18—A concerted showing of enclosed cars in the dealers' salesrooms in Fort Worth the latter part of December was enthusiastically received by the public, and many enclosed cars were sold. All dealers affiliated with the Fort Worth Automotive Trades Association had their stores handsomely decorated and showed enclosed cars exclusively on their floors. Street parades, with bands, were held on three days of the week, about 70 enclosed cars being in each parade. The trades association states that the undertaking proved highly satisfactory and that sales stimulation was very noticeable.

REO SAVING PLAN

LANSING, Mich., Jan. 19—Reo Motor Car Co. has instituted an employees' saving plan whereby its workers will be helped to bank a part of their earnings each pay day. The plan is made possible by the cooperation of one of the Lansing banks. Following the signing of a card signifying the amount of money intended to save each pay, Reo deducts this from the regular pay of the employee and deposits it to the account of the worker. Once a month the employee presents his pass book to have the amount of his savings written in.

\$5,181,942.35 Is Total Value of the C. H. Wills Properties

Appraisal Shows Marysville Company Has Fixed Assets of \$3,427,149.67

DETROIT, Jan. 22—Appraisal of the C. H. Wills & Co. properties at Marysville and other points as filed in United States Court here yesterday places a total valuation of \$5,181,942.35 on all assets taken on the basis that the company is a going concern. The appraisal is divided into four classes, the largest of which is fixed assets, \$3,427,149.67, and the smallest current assets, \$73,991.87. Cash is \$6,403.54.

One of the largest items in the merchandise inventory assets is finished cars at outside points which total \$461,005.97. These, the appraisal notes, have been inventoried at cost. Other finished cars at the factory are inventoried at either physical or reproduction value. The net sound value of the merchandise inventory is shown as \$1,593,991.47 as against the physical value of \$2,236,360.35. On fixed assets a total of \$796,197.21 is taken off for depreciation. This ranges from 5 per cent on buildings to 50 per cent on patterns, tools, jigs, etc., and almost 100 per cent on office fixtures.

The current assets are cash, \$6,403.54; accounts receivable, \$11,105.48; notes receivable, \$56,447.85; deposits, \$35.

Merchandise inventory assets: Car materials and supplies, \$1,129,999.92; finished cars at outside points, \$461,005.97; miscellaneous inventory, \$2,985.58.

Fixed assets: Land, \$200,280; buildings, \$850,388; building and factory equipment, \$552,391.26; machinery, \$1,019,314.13; patterns, \$47,564; tools, dies, jigs, fixtures, \$483,368.50; factory cars and trucks, \$6,200; office furniture and fixtures, \$29,070; perishable tools, \$238,573.26.

Deferred assets: Unearned insurance premiums, \$27,058.13; prepaid interest on loans, \$59,751.21.

New York Dealers' Assn. to Continue for Another Year

NEW YORK, Jan. 13—Representatives of ten local dealer associations in different parts of the state met here this week and decided to continue the temporary organization of the New York State Automobile Dealers' Association, which will become permanent if 40 per cent of the local associations agree to support it. The decision virtually assures the continuance of the organization for another year.

About 50 men, including dealers and a few trade association secretaries, attended the meeting. E. B. Jackson, president of the Wills Sainte Claire Co. of New York, presided and talks were given on traffic by Harry L. Stratton, of Stratton-Bliss Co., New York, and Harry A. Gaston of the Lexington Motor Car Co. of New York. The organization will be continued for the present under the

direction of temporary officers, who are: C. W. Bull of Syracuse, chairman; George Oestendorf of Buffalo, first vice-chairman, and E. B. Jackson, second vice-chairman.

The association hopes to exert a strong influence on legislation, traffic and other subjects of possible solution and much interest.

Bills Affecting Dealers Introduced in Delaware

WILMINGTON, Del., Jan. 18—While a number of bills are already before the Delaware Legislature—now two weeks old—affecting the interests of motor car owners, dealers and users, others are in sight from an outside source. The Legislature, prompted by the State Safety Council, it is understood, has invited all persons interested in motor legislation to place their views in the hands of the members. That must be done this week, however, to be assured of attention.

A bill has just been introduced by Senator Hardesty providing that motor vehicles operated by manufacturers and dealers for the purpose of testing, selling, demonstrating, or for any reason other than for hire or commercial reasons, shall be exempt from the necessity of individual registration, provided said manufacturer or dealer has taken out a license to engage in the business and has registered in the "dealer" class. The application for such registration shall state the number of cars to be registered and give other necessary information. No more than one motor vehicle can be operated at a time under the same registration number. All such cars must be operated by licensed drivers.

A bill is to be introduced, it is said, providing a road tax of one cent a gallon on gasoline.

FORD EXPORT IN NEW YORK

NEW YORK, Jan. 19—Ford's export center will be located in this city, it having been decided that the power and transmission show held in the Ford building at Broadway and 54th street last week, originally planned as an exhibition of industrial, agricultural and commercial machinery adapted for use with Ford trucks and Fordson tractors will be continued as a permanent export market with headquarters and showrooms in the Ford building. Seventy-two manufacturers with products ranging from lubricating oils to steel machinery designed to do the work of excavating, concrete mixing and heavy duty transportation have taken space.

The establishment of this export center will bring direct representation of the leading manufacturers of farm machinery and power appliances into one centralized exposition for the convenience of foreign buyers coming to New York City from all countries.

SALISBURY SHOW, FEB. 6

SALISBURY, Md., Jan. 19—This city will hold its fifth annual automobile show for five days, beginning Feb. 6. Details for the event are now being worked out.

Witnesses Say Standard Oil Causes High Gasoline Prices

Senate Committee Examines Head of Independent Oil Producing Companies

WASHINGTON, Jan. 19—The Senate's investigation of gasoline prices, which has been under way for six months before the Senate Manufacturing Committee, has again taken up the charge that the so-called Standard Oil Groups are responsible for the present price of gasoline that motorists must pay.

Hundreds of witnesses have been heard, but to date the committee has made little progress in solving the present gasoline cost. One of the last witnesses heard was L. V. Nicholas, president of the National Petroleum Marketers Assn., whose organization represents 850 independent oil producers, who declared before the committee in his testimony that "gasoline and oil prices are what the Standard Oil makes them."

"Gasoline and oil prices in the United States are determined solely by arbitrary dictation of the Standard Group, and for independent producers to survive, we are compelled to accept price decrees of Standard units even though this action results in losses at times," Nicholas said.

He recited instances for the committee of where independent companies had been forced to sell gasoline, he said, at one-half to one and one-half cents less than it actually cost to make, "all by reason of slashed prices by Standard."

The witness further pointed out that the oil industry was over-developed and declared the present equipment sufficient to last for ten years, without any additions.

Federal Truck's Third Sales School to Open This Month

DETROIT, Jan. 15—The third sales school of the Federal Motor Truck Co. of Detroit will open this month and plans are being made to give truck salesmen in all sections of the country a course at this school.

The object of the plan is to educate truck salesmen in the latest selling methods, as well as to educate them about the features of the 1923 Federal line.

A special room at the factory has been fitted up to take care of this plan and exhibits of parts and materials are being placed in these quarters to facilitate the explanation, which will be given the men.

The course will be directed by the factory executives, and M. L. Pulcher, vice-president and general manager; F. L. Pierce, sales manager; L. B. Dudley, advertising manager; R. H. Crooker, sales promotion manager, and C. L. Wood, chief engineer, will be among the speakers.

Milwaukee Show Under Way; Dealers Putting in Big Week

Newspaper Advertising Is Feature of Show Merchandising Campaign

MILWAUKEE, Wis., Jan. 22—This is the big week of the year in the local and state trade, both for distributors and dealers. The fifteenth annual Milwaukee show is under way in the Auditorium, having opened Saturday evening, Jan. 20, for an eight-day run. Distributors appear in the dual role of sellers to dealers and to consumers, for most of them handle the retail business in the Milwaukee city and county field, and wholesale trade in the Wisconsin and Upper Michigan territory.

This is the situation of the majority of exhibitors at the show. They are playing host to the people of the city and the dealers of the state. The show as usual is attracting a large attendance from even distant points in Wisconsin.

Supplementing the general show publicity and display advertising, Milwaukee dealers for the past week have been using a large aggregate of newspaper space on individual account to attract attention to their offerings at the show. At the same time a great deal of effort has been devoted to the merchandising of used cars, of which there is a plethora.

Statements emanating from various distributor and dealer concerns following annual meetings of stockholders disclose a most gratifying situation with respect to 1922 business. There is scarcely a dealer who did not double or treble his 1921 volume and in nearly every instance every past record was broken.

Milwaukee Automotive Plants Again at Capacity Production

MILWAUKEE, Wis., Jan. 19—All of the automotive industries here are again operating at full capacity schedules, following the holiday and inventory interruptions, which in many cases were of lesser extent than in other years, owing to the pressure of delivery instructions. Passenger car factories as a rule are back on heavy production schedules, both to cover unfilled orders and to make up stock for shipments later. The early part of the show period has served merely to confirm high hopes of a big spring business.

Motor truck manufacturers here are working steadily and current orders are described as wholly satisfactory, with prospects for spring demand considered very favorable. This applies both to freight trucks and passenger-carrying equipment. At this time many county boards in Wisconsin and other states are beginning to take steps for the investment of appropriations made at the annual sessions held in November and December for the purchase of trucks, tractors and other road construction and maintenance equipment. Considerable of this machinery, however, will not be

purchased until the good roads congress at Chicago later this month.

Nash is this week getting the first concrete results in the shape of finished cars from the addition completed Jan. 1 to enlarge its four-cylinder car division in Milwaukee 100 per cent. The first Lafayette cars to come through the new Milwaukee factory, which has replaced and supplanted the original works in Indianapolis, are due during the coming 10 days.

Service Equipment Associates' Slogan



NEW YORK, Jan. 19—The first work undertaken by the Service Equipment Associates recently organized in Chicago has been to standardize on a goldenrod color for service equipment insert pages for jobbers' salesmen. The idea is to make it easy for the jobber's salesman to distinguish the pages in his loose leaf book which lists service equipment from the accessories and supply section.

The Service Equipment Associates recommends that all manufacturers of service equipment adopt this color for their insert pages for jobbers' salesmen's books. The pages of the members of the Service Equipment Associates will be identified by the familiar face of "Larry" with the Service Equipment Associates' slogan, "The Best Equipped Shop Gets the Business" surprinted.

H. H. FRANKLIN BACK FROM EUROPE

NEW YORK, Jan. 19—Hurrying home from Europe for the show, H. H. Franklin, president of the Franklin Automobile Co., reached the city Saturday noon, just in time to be in at the close of the big exhibition. Franklin reports that while the foreign outlook is not as bright as it is in this country, still marked improvement has been made within the last year and he looks for a steadily increasing market for American cars abroad. His return finds things humming at the Franklin factory, which is working on a schedule of 1200 cars a month, with enough orders on hand to carry it well into the spring.

December Analysis for New York Shows Big Sales Decline

861 Low and Medium Priced Cars Sold; 145 Higher Priced Cars

NEW YORK, Jan. 18—The December analysis of sales in the Metropolitan section as made by Sherlock & Arnold, shows a total of 861 low and medium priced cars sold in that month, a decline from 3,760 in November, and 145 higher priced cars, as against 512 in the previous month.

A recapitulation for 1922 gives the aggregate sales in the low and medium priced class as 63,162 compared with 42,831 in 1921, and in the higher priced class, 6,903 as against 4,518 in the previous year. Total sales of all cars in 1922 were 70,065 and in 1921, 47,349.

In the low and medium priced sales of only two cars during December were more than 100 and of only three others over fifty. The rest dropped well behind. In the higher priced class, 10 sales of five cars were reported.

The recapitulation for the year follows:

Month	Medium and Low Priced	Higher Priced
January	2,014	283
February	2,230	273
March	6,352	632
April	8,428	862
May	8,467	961
June	8,203	865
July	7,816	678
August	5,921	516
September	4,592	511
October	4,518	665
November	3,760	512
December	861	145
Total	63,162	6,903

Pecos River Bridge Is Big Part of Los Angeles-East Road

COMSTOCK, Tex., Jan. 20—One of the most important pieces of highway construction between New Orleans and Los Angeles is the building of a bridge across the Pecos River, near the point where it empties into the Rio Grande, several miles southwest of here.

With the completing of the bridge there will be opened to automobile and other vehicle travel a cut-off stretch of transcontinental highway which will shorten the distance 200 miles between San Antonio and El Paso. The new bridge has some unusual features. It will span a canyon at a height of 320 feet and the structure will be one and one-half miles long. The route of the highway will closely follow the Rio Grande and will possess some wonderful scenic beauties. The fact that the Pecos River flows through a deep and impassible canyon for more than two hundred miles of its lower course has made it necessary, until the building of the new bridge, for travelers to go north to Sheffield 100 miles in order to find a crossing point.

IN THE RETAIL FIELD

The Winton Co., under the policy inaugurated early last year, announces the replacement of two more of its direct factory branches with dealer representation, in Pittsburgh and Seattle. The Pittsburgh territory formerly covered by the Winton branch has been taken over by C. J. Siors, who will operate under his own name, but will take over the building formerly occupied by the branch at Baum boulevard at Beatty street. The Pioneer Auto Co., Fourth and Columbia, Seattle, Wash., has taken over the Seattle territory and the factory branch has been closed. O. M. Berthold is manager.

L and L Auto Supply Co., 4424 Broadway, Chicago, has been incorporated with a capital of \$10,000 to deal in automobile supplies and accessories.

Roosevelt Motor Sales Co., 3838 W. Roosevelt Rd., Chicago, has been incorporated with a capital of \$10,000 to deal in automobiles and motorcycles.

The Davis Motor Sales Corp. of Nashville, has filed application for a charter with the secretary of state of Tennessee. It will be the sole distributors of the Haynes Automobile Co. in Middle Tennessee, according to its announcement.

The Hamilton-Browning Motor Co. of Gallatin, Tenn., has been sold to the Kirby Bros. of Smith's Grove, Ky., and will be continued in business as the Kirby Motor Co., in Gallatin. They are Ford agents for this section.

Frank Miller, district manager for the Mack factory, will hereafter make his headquarters in the Joe R. Cook salesrooms, Davenport, Ia. Cook, local distributor for the Peerless, has also taken the Mack truck agency and will handle full line of accessories and parts.

L. S. McPhail is president and Charles B. Todd, secretary and treasurer of the newly incorporated Ohio Motors Co., which has taken over the business of the Wills Ste. Claire Columbus Co. at 207 E. Broad street, Columbus. This company also will distribute Overland and Willys-Knight cars.

Paul E. Myers Motor Co., Canton, O., has been chartered with a capital of \$30,000 to deal in cars and operate a service station by Paul E. Myers and others.

The Chagrin Valley Garage Co., Gates Mills, O., has been chartered with a capital of \$5000 by Frank Morton.

The Garford Truck Sales Co. has been chartered at Youngstown, O., with a capital of \$25,000, by R. R. McCormick and others.

L. H. Abbott, for many years a leading figure in the automobile business in Syracuse, has been made general manager of the Revoir Motors, Inc., distributors of the Hudson and Essex cars for Central New York.

To take care of expanding business, the firm of C. W. Frey & Sons, Bloomington, Ill., has decided to add two stories to their building, 300 to 308 W. Washington street. At present the plant occupies but one floor, 115x138 ft.

H. E. Thede, Moline, Ill., addressed the members of the Decatur, Ill., Automotive Dealers Assn., Jan. 11, discussing "Accessories and Tires." The question of a winter show of cars was discussed and a committee, of which Leo Hayes is chairman, was appointed to investigate building possibilities.

The Thackaberry Automotive Co. has been organized at Sterling, Ill., and will operate a garage and sales agency at 9 to 11 W. Fourth street. The promoters include M. S. Thackaberry and Harry Laidig.

Seventy-five Ford dealers and their salesmen from central Illinois points, assembled at Bloomington on Jan. 11 to hear H. E. Merritt, manager of the service department of the Chicago branch, W. H. Wahl and C. H. Frehe, both branch road men, and Frank Doubet, assistant manager of the Chicago branch, tell of trade conditions.

Montgomery & Zaeffel, Beason, Ill., have sold their garage to Russell Jett, who took possession on Jan. 15. The latter plans some expansions and will add several new lines.

The East Side Motor Sales Co. is a new St. Paul company organized by R. C. Daube, Lulu

G. Daube and Lemuel C. Whitney. The capital is \$50,000.

The Minnehaha Chevrolet, Inc., capital stock \$20,000, is a St. Paul corporation formed by W. L. Staples, A. T. Staples and J. H. Voosen.

The Victoria garage has been opened by B. A. Price at Grand avenue and Victoria street, St. Paul, with capacity to store 100 machines, with all the usual service attentions. The showroom is 25x67 ft.

The Laybourn Auto Co. has been incorporated in Minneapolis at \$50,000 by G. P. Laybourn, M. J. Ostul, D. R. Laybourn. It will deal in all lines of automotive goods and accessories.

The Kelly Automobile Co., Minneapolis, is organized with \$100,000 capital. Incorporators are B. R. Kelly, L. C. Boss and E. C. Carrigues.

Dodson Automobile Co., Inc., Norfolk, Va., has been chartered for general automobile and garage business. W. P. Dodson, Jr., is president and V. W. Dodson secretary.

Payne's Auto Works, Inc., Charlotte, N. C., has been chartered to manufacture and repair automobiles and other motor vehicles.

The Motor Supply Co. of Spartanburg, S. C., has been chartered with a capital stock of \$10,000. C. H. Henry is president and treasurer and D. W. McCell, vice-president and secretary.

Currier & Bannock, Stevens Point, Wis., district dealer in the Dodge, have opened a branch sales and service house at Wisconsin Rapids, Wis., to handle Wood county business.

The Wussow-Williams Co., 1130 Teutonia avenue, Milwaukee, has been appointed city dealer in the Paige and Jewett.

Hingiss & Bessler, Kiel, Wis., will rebuild their garage, service shop and implement warehouse, recently destroyed by fire, the estimated cost being \$30,000.

William Knaack, Nineteenth and Monroe streets, Milwaukee, is building a service station and repair shop, with a filling station and automotive accessory store in connection.

The Manitowoc (Wis.) Motor Sales Co. has filed articles of incorporation. The capital stock is \$20,000 and the incorporators are Leroy J. Anderson, Gerald Zander and Norbert H. Hartung.

The August Brandt Co., Appleton, Wis., Ford dealer, has increased its capital stock from \$75,000 to \$125,000. It recently completed a new sales and service building costing about \$45,000.

The Appleton (Wis.) Auto Co. has been incorporated with \$20,000 capital stock by Edward F. and Herman L. Schneider and Frank Shafer to deal in new and used cars, conduct a garage and service station, etc.

Howard Tucker and Ira Russell, Ripon, Wis., have formed a partnership to engage in the tractor, truck and farm operating equipment business.

The Klemme Bros. Co., Sheboygan, Wis., is a new \$25,000 corporation organized by William Klemme, M. A. Fleury and M. T. Klemme to deal in automotive equipment, tires, and do general automotive and tire repair work.

The Badger Auto Service Co., Milwaukee, has been incorporated for \$20,000 by Paul Rossman, K. X. Zlab and A. L. Rossman to render general automotive service and deal in vehicles, equipment, etc.

The Farmers Supply Co., Mauston, Wis., of which C. A. Jones is proprietor and manager, has been appointed dealer in Moline farm equipment in Juneau county. A line of passenger and commercial cars is to be added next spring. A new sales, warehouse and service building has just been provided.

The Brown County Motors, Inc., Green Bay, Wis., is taking occupancy of its new sales and service building, erected and equipped at a cost of nearly \$35,000.

Among the new dealers of the General Motor Truck Co. are the following: N. E. Waterman, Binghamton, N. Y.; T. F. Saunders, Fresno, Cal.; J. A. Salstrom, Tonopah, Nev.; Bank Auto Co., Park Rapids, Minn.; Wahoo & Western Auto Co., Wahoo, Neb.

Goodyear Stockholders File Suit Against Kennedy Company

Demand Return of \$493,082 Said to Have Been Paid for President and Treasurer

AKRON, Ohio, Jan. 19—On behalf of stockholders of the company, Francis Seiberling and Russell Robinson of Akron, directors of the Goodyear Tire & Rubber Co. of Akron, have filed suit in the courts of Akron against Goodyear, the Leonard Kennedy Co. of New York and all stockholders in the Kennedy Co., demanding the return to Goodyear of the sum of \$493,082, alleged by them to have been paid the Kennedy Co. as "compensation for furnishing Goodyear with a president and treasurer."

This newest suit involving the Goodyear \$85,000,000 refinancing, the legality of which already has been attacked in four separate actions filed on behalf of Goodyear stockholders by Mrs. Laura T. Weiss of Cleveland, follows the filing here in the Weiss suits, of depositions of E. G. Wilmer, Goodyear president, and Clarence Dillon, head of the New York financial house of Dillon, Read & Co.

Wilmer's deposition, taken in New York, contains his sworn statement to the effect that the Leonard Kennedy Co., of New York, under contract with the Goodyear Co., from May 1, 1921, to May 1, 1922, was paid by Goodyear \$250,000 plus five per cent of profits in excess of \$10,000,000, which amounted to \$308,082, making a total paid the Kennedy Co. of \$558,082. Wilmer also makes the sworn statement that of this amount the Kennedy Co. paid him \$50,000 annually as salary as Goodyear president, and paid P. H. Hart \$15,000 salary as Goodyear treasurer, leaving \$493,082 as compensation for the Kennedy Co. for furnishing the Goodyear president and treasurer.

Wilmer also admits Goodyear is paying the expenses of himself and Hart in Akron and is also paying \$700 a month house rental for himself.

This contract with the Leonard Kennedy Co. is attacked by Mrs. Weiss, who seeks to have Goodyear restrained from making any further payments under it, on the ground that it constituted an unwarranted dissipation of Goodyear assets. Since the filing of the Weiss actions, Goodyear directors have abrogated the original contract and have written a new one, continuing the payment of \$250,000 a year but eliminating the five per cent bonus clause. Seiberling and Robinson and attorneys for Mrs. Weiss say the new contract is not acceptable and that it will also be contested.

MANKATO SHOW, FEB. 28

MANKATO, Minn., Jan. 22—The Mankato Retail Automobile Dealers Assn. will hold its annual show Feb. 28 to March 3 in the newly completed Fifth Regiment Armory, which provides ample floor space for a satisfactory display.

DANVILLE SHOW IN MARCH

DANVILLE, Ill., Jan. 19—At a luncheon at the Elks club, members of the Danville Automobile Dealers' Association, voted to give a show of cars some time in March at the state armory. This

building, just completed, furnishes ideal quarters for such a display and is the first satisfactory structure that has been available. Committees have been appointed to decide upon the date and make other arrangements.

CONCERNING MEN YOU KNOW

Wells Levens, St. Cloud, Minn., has been appointed manager of the Minneapolis branch of the International Harvester Co. of America. He succeeds C. A. Claypool transferred to Fort Dodge, Ia. Before going to the St. Cloud branch three years ago Levens was at Winona, Minn., for eight years.

Thomas E. Curtin, one of the pioneer automobile dealers of Columbus, O., who has been with the sales department of the Ralston Steel Car Co., has reentered the automobile business and is now sales manager of the Ralstro Auto Sales Co., distributors of Durant, Star and Locomobile cars.

W. L. Wallace, who for a number of years has been manager of the Fort Wayne, Ind., branch of the E. W. Steinhart Co., has tendered his resignation effective Jan. 15. Guy S. Means, who has been serving as manager of the Steinhart company at Richmond has been appointed to the managership of the Fort Wayne branch.

Edgar Allan Poe, Jr., has accepted appointment as general counsel for the Automobile Club of Maryland. He succeeds the late Osborne I. Yellott, who was killed in an automobile accident several months ago.

Geo. Crittenden, one of the pioneers going back to the early days of motoring when he was Premier dealer in Boston, and until a few years ago a partner in the Chandler New England Co., who retired a few years ago, could not keep out of the industry so he has become retail sales manager of the Lovejoy Shock Absorber Co., whose headquarters are in Boston.

Harry L. Post, assistant sales manager of the Seiberling Rubber Co., has been elected vice-president and sales manager, succeeding the late Irving R. Bailey, whose death occurred Jan. 9, following a stroke of apoplexy suffered on New Year's day. Post also becomes a director of the Seiberling Co. Post virtually "grew up" in the rubber industry under Bailey, serving as his assistant when Bailey was with the old Diamond Rubber Co., prior to its merger with the B. F. Goodrich Co.

E. V. Wenzell, until now associated with the Cincinnati (O.) Grinder Co., has joined the Giddings & Lewis Mfg. Co., Fond du Lac, Wis., manufacturer of lathes, tools and other metal working equipment, in the capacity of director of sales. He has been connected with the machine tool industry nearly 20 years, starting his career with the Norton Co., Worcester, Mass., then going to the Modern Tool Co., Philadelphia.

S. S. Morehouse has been appointed sales manager and director of service of the Wisconsin Oakland Co., Milwaukee, distributor of and dealer in the Oakland, to succeed P. T. Allen, resigned.

Benjamin F. DeDiemar, who retired Jan. 1 as clerk of the circuit court at Kenosha, Wis., has become vice-president of the Perfect Carbon Remover Co., Milwaukee, in charge of the sales department. The headquarters are at 425 Sycamore street.

Charles W. Nash of Kenosha, Wis., president of Nash Motors Co., and the LaFayette Motors Corp., Milwaukee, was elected a director of the First Wisconsin National Bank of Milwaukee at the annual meeting of stockholders on Jan. 9.

B. Harold Hokanson, president of the Hokanson-Oakland Co., Madison, Wis., died Jan. 7 at the age of 33 years. He was a brother to Rudolf Hokanson, vice-president and general manager, Nash Sales Co., Milwaukee, and of Emil Hokanson, president of the Wisconsin Oakland Co., Milwaukee. He was a World War veteran. He was a native of Sweden, coming to America in 1912 to join his brothers, then conducting a large sales and service business in Madison.

L. Percy Kilbourne, for 12 years associated with the Geo. W. Browne interests at Milwaukee, distributor of and dealer in the Overland and Willys Knight, has resigned. He formerly managed the branch houses at Madison and Green Bay, Wis., returning to the Milwaukee headquarters in 1921 to handle wholesale distribution.

Abbott L. Johnson, president of the Warner Gear Co. and the Glascock Body Co., pioneer gear manufacturer, and prominent citizen of Muncie, Ind., died Jan. 11, at his winter home in Daytona, Fla., after an extended illness, superinduced by a severe attack of pneumonia suffered last April.

Joseph Peters, sales manager of the Thompson Auto Co. of Detroit, was elected president of the Star Salesmen's Club of the Federal Motor Truck Co., at the annual convention of that association in Detroit. I. C. Beck of the Federal Motor Truck Co. of Philadelphia, was elected secretary and H. F. Matthys, of the Thompson Auto Co. of Detroit was elected treasurer.

H. H. Rice, president of the Cadillac Motor Car Co., announces the election of Lynn McNaughton, general sales manager, as a vice-president of the company.

Hugh M. Craig, formerly general sales manager of the Samson Tractor Co. at Janesville, Wis., and previously assistant to the general manager of the Janesville Machine Co., manufacturer of farm implements, has been appointed manager of the Olds Motor Works branch recently established at Atlanta. J. H. Ellis, service manager of the Detroit branch of the Olds company, has been transferred to the same position at Atlanta.

Cliff Knoble, advertising manager of Liberty Motor Car Co., has resigned to become a member of the Brooke, Smith & French organization in Detroit.

L. F. Vollmer, formerly in charge of the automotive equipment division of the Ohio Rubber Co. at Cincinnati, has been made general manager of the Cincinnati office, with Walter Qualey as his assistant.

Lynn B. Dudley, formerly advertising manager of the Federal Motor Truck Co., had joined Campbell, Trump & Co., advertising agency, Detroit.

Stacey H. Cosley, who has been associated with the automotive industry for 22 years, has been appointed central western representative for the Laminated Shim Co. of Long Island City, N. Y.

Fred W. Gorman has been added to the sales personnel of the Star Rubber Co. as southern district manager with headquarters at Atlanta. Gorman's considerable experience in the tire business includes successful terms with Brunswick and Dayton.

Truck Manufacturers Attend Conference Held in New York

NEW YORK, Jan. 19—More than 100 representatives of the motor truck manufacturers holding memberships in the National Automobile Chamber of Commerce attended the special motor truck conference last Thursday. After a day spent in listening to addresses and discussion, the conference announced its interest in the Boston used car plan and decided to attempt to nationalize it and apply it to motor trucks, with such modifications as may be necessary to permit of its use in this field.

The conference also adopted the revised caution plate for trucks upon which a committee has been working for some time, and approved the definition of common carrier principles as outlined by the

Motor Vehicle Conference Committee, with which is affiliated the American Automobile Association, the Motor and Accessory Manufacturers' Association, the National Automobile Chamber of Commerce, the National Automobile Dealers' Association and the Rubber Association of America.

PHILADELPHIA SHOW A SUCCESS

PHILADELPHIA, Jan. 22—The twenty-second annual automobile show conducted by the Philadelphia Automobile Trade Assn. closed Saturday night after a very successful week. The show was held in the exhibition hall of the Commercial Museum. Fifty-seven dealers had exhibits of 300 models of 69 makes of cars. There were 62 accessory exhibitors. The average daily attendance was about 5600, afternoons and 8000 evenings.

Springfield Body Co. Buys Plants Middle West and East

Will Have Output of 15,000 Custom Built Type Bodies a Year

NEW YORK, Jan. 21—The Springfield Body Corp. announces the purchase of a factory at Bloomfield, N. J., and another at Pontiac, Mich., which with the original unit at Springfield, Mass., will have a yearly output of 15,000 bodies of the custom built type.

Charles C. McElwain, treasurer of the Kidde Bros. & Co. and director of the Safe Deposit & Trust Co. of Springfield, Mass., has been elected chairman of the board of directors of the company. Other directors are Harry G. Fisk, vice-president of the Fisk Rubber Co. and director of the Union Trust Co.; Frank A. Woods, director of the Safe Deposit & Trust Co. and of the Farr Alpaca Co. of Holyoke, Mass., and Victor M. Tyler, president of the Acme Wire Co. of New Haven and director of the Gotham National Bank of New York. C. S. Dame is president; A. H. Wolfe, vice-president, and Frank M. Livingston, controller, are also directors of the Springfield company.

M. H. Kammer, who has had 25 years' experience as a custom body builder, has been placed in charge of the manufacturing division. B. O. Provins, formerly identified with Rolls-Royce, is assistant to Dame. J. W. Sarles, also previously with Rolls-Royce, will serve as works manager at the Springfield plant, and R. J. Schuler, formerly associated with the Detroit Gear & Machine Co., will act as Detroit representative.

It is announced that the financing of the Springfield Body Corp. has been entirely completed and the work of equipping the two new plants, completing the addition of the Springfield plant, and assembling the personnel and working forces is well under way. The plant at Bloomfield, which contains 175,000 sq. ft. of floor space and occupies 14 acres, has been purchased from the General Motors Corp. Vice-President Wolfe has taken direct charge of this unit and will have it in operation by April. It is situated on the Erie railroad and has extensive storage facilities for chassis and completed cars. There are 280,000 sq. ft. of floor space and 16 acres in the plant at Pontiac, purchased from the Friend Motor Co., and is situated on the Grand Trunk railroad. Kammer will take direct charge of this unit and plans to have it in operation by July.

TENT FOR WINTER SHOW

JACKSONVILLE, Ill., Jan. 19—Automobile dealers here, unable to procure a satisfactory building, will rent a tent for the winter show. A committee has been appointed to select a site and determine the best date for the show. The merchants and manufacturers of the city have agreed to co-operate and will furnish exhibits of various kinds.

BUSINESS NOTES

The K. & M. Truck Body Works at Tekonsha, Mich., will start steady production on truck cabs and stake and closed bodies for Fords early this spring.

Work is nearing completion on additions to three Jackson plants closely identified with the automotive industry. These are the Riverside Machine Co., Reynolds Spring Co., and the Morrison Stamping Co.

White Motor Co. declared the regular quarterly dividend of \$1 payable March 31 to stock of record March 20.

H. H. Franklin Mfg. Co. declared regularly quarterly 1 3/4 per cent dividend on its preferred stock, payable Feb. 1 to stock of record Jan. 20.

The Galesburg, Ill., Tire and Rubber Co. has been organized and is installing machinery at the plant, 244-246 E. Simmons street, for the production of hand made tires. H. V. Anderson will be general manager. It is planned to manufacture 20 to 40 tires a day.

William J. Connell, head of the W. J. Connell Co., of Boston, handling accessories, announced during the New York show that he had placed an order with the Gabriel Snubber Co. for \$130,000 worth of its goods.

The Weldless Rolled Ring Co., Cleveland, O., has leased a building at 10022-26 Detroit avenue, installing machinery to manufacture ring gear blanks and bearing ring blanks that are used in the automobile industry. Production in the plant will start Feb. 1. Samuel V. Hunning, for some years metallurgical superintendent of the Washington Steel & Ordnance Co., is president.

The Red Top Cab Co. began operation in Minneapolis Jan. 13. In the Twin Cities there will be operated 100 cabs. They are built by the Yellow Cab Co. of Chicago.

The Manufacturers Chemical Co. of St. Paul Park, suburb of St. Paul, which is now turning out 100 barrels of carbon a day made from straw, is making tires as a byproduct.

The Minneapolis Gear & Shaft Co., Inc., is a new organization capitalized at \$25,000 to deal in automobiles. Harold Garmoe, Charles Hyborg and Erwin Johnson are incorporators.

The Nu Way Auto Bed Co., Inc., St. Paul, is a new corporation to make collapsible steel beds for automobiles. The authorized capitalization is \$50,000. Offices are 416 Pioneer building.

The McCrea Mfg. Co., Minneapolis, has been

formed to make bodies, cabs and tops for automobiles. The capital is \$50,000.

The Master Self Locking Differential & Mfg. Co. of Green Bay, Wis., has just taken occupancy of its new manufacturing building and is increasing its capitalization to facilitate the development of the plant and handle the increasing volume of business from passenger car as well as commercial vehicle makers.

The University of Wisconsin, Madison, will start work at once on an \$80,000 building to be used as a garage, service shop, paint shop and warehouse for the automotive equipment of the institution and faculty.

The Biggam Trailer Co., originally established in Milwaukee, but for the past year operating a plant in Racine, Wis., is undergoing a reorganization. To conserve the assets, the Racine court has granted a petition for a receivership, and L. E. Pitner, secretary of the corporation, has been placed in charge of affairs. Unless reorganization can be effected locally, it is intended to move elsewhere.

Another factory addition is being erected by the Falls Motors Corp., Sheboygan Falls, Wis., to enable it to make more prompt deliveries of engines to its trade. The present construction involves a two-story fireproof building, 50x90 ft.

The C. A. Shaler Co., Waupun, Wis., maker of vulcanizing equipment, tools, headlight lenses, etc., has completed the entire reconstruction of its plant by moving into its handsome new office building. The plant was almost totally destroyed by fire last March, and the new main factory was finished in November. The present capacity is about 75 per cent greater than that of the original factory.

The Sikkone Dry Storage Battery Co., an Iowa corporation, which has opened a plant at Jefferson, Wis., has been granted a Wisconsin charter. G. E. Shulgart, secretary of the corporation, is in direct charge of activities at Jefferson.

The Anderson Company, manufacturer of automobile parts and accessories, has moved from South Bend to Gary, Ind., where it has occupied a new building.

The Lubretor Co. has been organized at Columbus, O., to manufacture a lubricating device in connection with which a special oil will be used. C. H. Neil is president of the new company; W. H. Bone, vice-president; H. B. Halliday, treasurer; H. M. Bone, secretary.

Birmingham; Cecil Cowan, Birmingham; R. D. Nelly, Selma; M. K. Johnson, Montgomery; J. A. Brock, New Brockton; R. W. Ruack, Chicago; C. M. Canon, Opelika; Isham Dorsey, Opelika; V. P. Cherry, Opelika; Henry C. Flite, Montgomery; Knox Henderson, Troy; Jay Walden, Dothan; L. R. Goree, Montgomery; J. F. Stukenberg, Montgomery; R. L. Pearce, Troy; E. W. Moore, Atlanta; J. H. Stephens, Tuscaloosa; Joseph Lyons, Mobile; T. D. McGough, Montgomery; E. J. Devinney, Montgomery, and J. I. McKinney, Montgomery.

DRAFTING UNIFORM TRAFFIC LAW

COLUMBUS, O., Jan. 15—The special committee representing the city solicitors and law departments of the various counties of Ohio, named to draft a uniform traffic code for the state, started functioning in Columbus shortly after the first of the year. A vast number of propositions are before the committee and the work will require days of study and discussion. The committee was unanimous against a law compelling all drivers to carry licenses, which would mean the maintenance of a large number of inspectors to test the various applicants for driving licenses.

It was also the consensus of opinion that no uniform traffic code could be devised for all Ohio cities, but that certain classifications as to population and density would have to be considered.

Shortage of Skilled Workmen in Eastern Body Plants

Philadelphia Shops Training Men to Keep Up With Pace of Orders

PHILADELPHIA, Jan. 20—Philadelphia automobile bodymaking and assembling plants are exceedingly busy and short of skilled workmen. The American Motor Body Co., operating the old Hale & Kilburn plant at Eighteenth street and Lehigh avenue, has been compelled to train men for its upholstering and trimming department, in order to overcome the shortage of help.

Owing to the seasonal decline in outdoor construction, many woodworkers and cabinetmakers have accepted indoor work at the American Motor Body Co. plant, which is producing more than 200 bodies a day. The company also is engaging as many skilled painters, varnishers, trimmers and woodworkers as it can find, and although 1,600 men are already at work, it has a capacity of 2,200 which it is trying to fill. It has adopted the policy of employing women, also, in upholstering and trimming.

C. W. Wright, superintendent of the Ford Motor Co. assembling plant at Broad street and Lehigh avenue, says the present labor supply is inadequate. The present force is about 800 men, the smallest number engaged in two years. It is hoped to have 1,000 men, the peak number, at work here by spring.

A manufacturer of commercial electric trucks has sufficient orders to keep its present force, the largest in its history, busy for at least three months. A 75 per cent increase in the number of its employes is planned.

Another plant engaged in body building has 3,700 workers on its pay roll, the largest number employed here since June of 1920, and is still in the market for a considerable number of "semi-skilled" workmen.

ALABAMA FAVORS GAS TAX

MONTGOMERY, Ala., Jan. 20—From the sentiment in favor of a two cent gasoline tax in Alabama for the maintenance of the highways of the state, it would appear that the present legislature which convened Jan. 8 will be practically forced to enact a law levying this tax.

In his message to the legislature, the retiring governor, E. M. Kilby, recommended that this tax be imposed upon gasoline for the purpose of providing revenue for the maintenance of the highways.

The automobile association of the state, which met in Montgomery, endorsed this form of taxation for the maintenance of the roads, and many other associations and organizations, state officials and the incoming state officials are in favor of such a law.

1000 Attend "Ask 'Em to Buy" Meeting in New York

NEW YORK, Jan. 13—More than 1000 persons interested in selling automotive equipment attended a merchandising meeting in Carnegie Hall Wednesday afternoon as guests of the Metropolitan jobbers in the Automotive Equipment Assn.

The speaker of the meeting was Ray W. Sherman, merchandising director of the A. E. A., who presented the association's educational films: "Ask 'Em to Buy" and "Shop Profits." In one of his characteristic talks he directed attention to some of the fundamental success factors in automotive equipment selling. Sherman was introduced by Robert A. Stranahan, president of Champion Spark Plug Co. and chairman of the A. E. A. merchandising committee.

The jobbers who cooperated in holding the meeting were Wetmore-Savage Co., Boston; Weaver-Ebling Co., Pruden Hardware Co. and Lowe Motor Supply Co., of New York; Martin-Evans Co. and James Martin, of Brooklyn; Elin Auto Supply Co. and Economy Auto Supply Co., of Newark, N. J.

Among the many automobile dealers attending the meeting were: Reese Adamson, Birmingham; Ben Stoll, Birmingham; E. L. Scouten, Birmingham; W. B. Smith, Birmingham; Charles Hawley,

The READERS' CLEARING HOUSE

Questions & Answers on Dealers' Problems

Collection Under Missouri Lien Law

Q—Give correct methods of procedure to dispose of a car held for repair bill. We have had the car several weeks. The owners, who were tourists, collided with a truck, wrecking the car, which was brought to our shop for repairs. The car owners' claim the truck driver was responsible for the damage and expected to make the truck owners pay the bill. When the repairs were completed on the car the car owner called on the truck owners, asking them to pay the bill or arrange with us to release their car.

The truck owners informed them they were not ready to make a settlement, because the car owners at the time of the accident had liquor in their possession and had evidently been drinking, and they wanted to investigate more thoroughly before making any kind of settlement. The car owners said no more, but returned to our shop, took their luggage and left. They did not return and we have no idea where to locate them, as they did not leave names or addresses.

We seem to be holding the sack. Can we not sell this car and keep the amount of the repair bill out of the proceeds of the sale?—Foster & Pendleton Garage, Rayton, Mo.

A—The Missouri law gives you a lien on the car left with you for the repairs, labor and materials used and, for storage. But, there appears to be a troublesome joker added to your statute, in which the garageman is given a lien for furnishing labor or material on any vehicle, part or equipment thereof, "who shall obtain a written memorandum of the work or material furnished, or to be furnished, signed by the owner of such vehicle, part or equipment thereof, and the lien shall be for the amount of such work or material stated in the written memorandum."

Now, if you did not get this required written memorandum, then it appears your lien is no good as to the work and repairs, though a signed memorandum is not required as to any charge due for storage. This joker is a bad feature. Were I a Missouri dealer and repairman, I would hold possession under a claim under the common law. Of course, under the common law lien one can only retain possession and cannot sell. Where one has complied with the statute, which is section 7278, Revised Statutes of Missouri, 1919, he is given authority to sell.

If you have a charge for storage you might sell the car for your storage, and include your charges for repairs. Sale for storage would be legal, without the signed memorandum. Then should the parties later return and attack your right to the amount covering the repair

The Readers' Clearing House

THIS department is conducted to assist dealers and maintenance station executives in the solution of their problems.

Readers' names will not be published with articles, if a request to this effect is received with the letter. The name and address should be given, however, so that we can send a copy of our answer direct by letter. This saves waiting for the answer to be published, which sometimes occurs several weeks later, depending upon the space available.

Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been made and these are answered by reference to previous issues.

Inquiries not of general interest will be answered by personal letter only. Emergency questions will be replied to by letter or telegram.

Addresses of business firms will not be published in this department but will be supplied by letter.

Technical questions answered by B. M. Ikert, P. L. Dumas and A. H. Packer; Legal, by Wellington Gustin; Paint, by G. King Franklin; Architectural, by Tom Wilder; Tires, by a Practical Tire Man; General Business questions, by MOTOR AGE organization in conference.

bill, you could defend successfully such suit.

You may sell the property according to section 7251 of the Missouri laws and the proceeding is as follows:

"The person claiming the lien shall file with the justice of the peace of the ward, district or township in which he resides, a statement duly verified by himself, his agent or attorney, setting forth his account and a description of the property on which the lien is claimed, and thereupon the justice shall issue a summons, as in ordinary civil actions, returnable forthwith, and upon a return of the summons, duly served, shall set the cause for hearing at any time after the lapse of one day."

Now if the owners cannot be found and the justice is satisfied after proof offered that the owner is not a resident of the county, then the justice shall order a notice of the proceedings to be published for three successive days in a daily newspaper, if one be published in

the county, and, if there be none, once in a weekly if such be published in the county.

If no paper be published in the county, then by six handbills put up in six public places in the county, notifying the defendant of the filing and the particulars of the account, the description of the property, its whereabouts and the day and place set for the trial, which must be not less than 10 days from the day of the last publication. Then on the trial day the case is tried as any ordinary case in a justice's court. A judgment will carry with it an order of sale of the property upon which the lien is found to exist to satisfy the same.

Now, if a lien claimant does establish an indebtedness on the account but does not establish the lien as claimed, he may obtain a judgment for the amount, but the costs of the suit or any part thereof may be taxed against him. This is another reason for my suggestion as to storage lien. You can see now the joker in your own lien law; however, if you follow these directions before your justice of the peace, you should be able to get your money.

READER SUGGESTS USE OF GLUCOSE AS AN ANTI FREEZE COMPOUND

We are enclosing a clipping from the automobile section of the Kalamazoo Gazette, Kalamazoo, Michigan, in which glucose is recommended as an anti-freeze compound for radiators. What do you think of this material?—H. B. Freeland, Sturgis, Mich.

The article from the Kalamazoo Gazette is as follows: Philadelphia, Dec. 9—Glucose is recommended as a preventive of automobile radiator freezing by Dr. Charles H. LaWall, of the department of theoretical pharmacy, Philadelphia College of Pharmacy and Science.

"For four winters past I have successfully employed commercial glucose with unquestioned efficacy and with no detrimental results whatever," explained Dr. LaWall. He believes that glucose is superior to anti-freezing mixtures containing denatured or wood alcohol, glycerine or some chemical such as calcium chloride. The ordinary confestioneers' white glucose is prepared, although on one occasion he used the glucose sold for table use.

The amount necessary is between 15 and 20 per cent, or about a pint and a half of glucose to a gallon of water. The glucose may be mixed with enough warm water completely to dissolve it and then added to the remainder of the water in the radiator. No further addi-

(Continued on next page)

Architectural Service

IN giving architectural advice, MOTOR AGE aims to assist its readers in their problems of planning, building and equipping, maintenance stations, garages, dealers' establishments, shops, filling stations, and, in fact, any building necessary to automotive activity.

When making request for assistance, please see that we have all the data necessary to an intelligent handling of the job. Among other things, we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how

large it is expected to be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

How much of an accessory department is anticipated.

Garage With Basement Shop

Q.—We are figuring on building a general garage on a lot 50x142 ft. and would appreciate your giving us a plan and any suggestions you might have. Below I will try and sketch the lay of the lot.

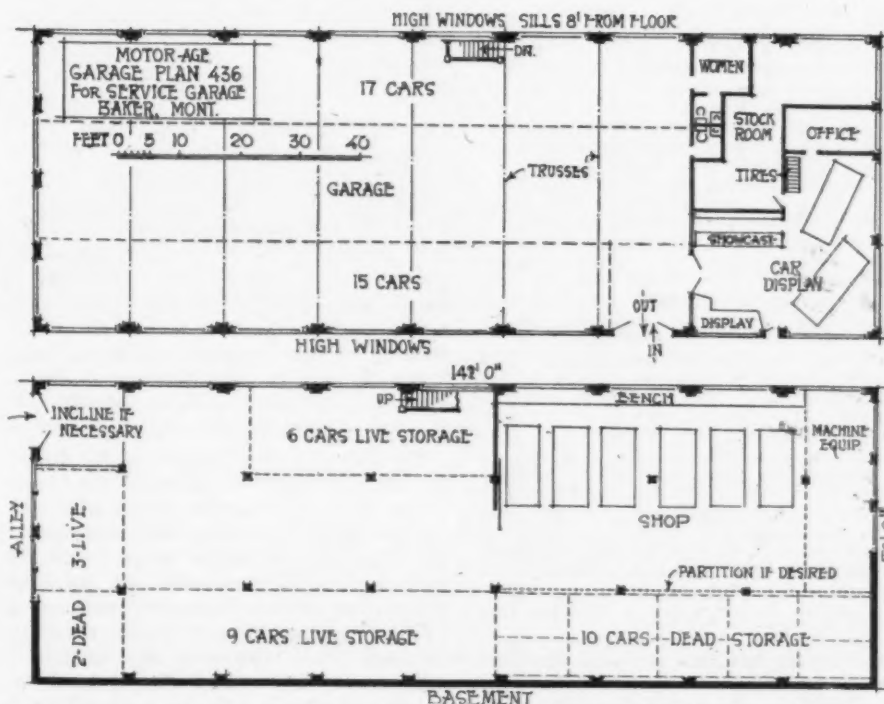
In your March 2nd Motor Age you have a plan of a garage without a showroom. While our business now is mostly storage, repairing and accessories, we would like to have a showroom large enough for at least one car.

Trusting we may see the above information in the near future in Motor Age.—Service Garage, Baker, Montana.

We would naturally think it hardly safe to install the shop in the basement of this building unless there is absolutely no chance of anyone building next to it. There is insufficient light at either end for a shop and if it should be cut off on the side there would be no natural light at all.

At best the shop would be none too light and would be much better on the main floor with the basement reserved for storage only.

We presume the front of the building or the main traveled street is the one extending along the side, the long way, and that the entrance should be on this side. Then it would be best to locate the accessory store along side of this



entrance with the car display room at the corner so it could be seen down the street both ways.

The basement entrance would perhaps

be better from the alley, then if the authorities took a notion to grade up the street and extend it you would not be so badly out of luck.

(Continued from preceding page)

tion or attention is necessary except to replace the water lost by evaporation. When warm weather arrives, the radiator should be emptied, rinsed out and filled up with plain water.

"In addition to using the mixture, practically four years with satisfactory results, I also performed some experiments to determine the congealing point of such a mixture," said Dr. LaWall. "I found that it begins to get slushy at about 10 degs. above zero Fahrenheit, but that it does not actually freeze and harden even at 6 degs. below zero Fahrenheit.

"Glucose does not corrode or affect metals; in fact, it prevents such action by virtue of its chemical reducing properties. It seems to have no effect on rubber, in the dilution used; at least, I have never had to replace my rubber hose connections. There are no objections to glucose at all that I have found, and its inexpensiveness and freedom from annoyance of constantly having to replace a volatile solvent such as alcohol are unquestioned advantages."

MOTOR AGE has no definite records as to tests made as above indicated and consequently can give no definite information. One simple way of trying such a solution would be to mix up a small quantity in the proportions indicated

and leave it set outside in a pan. If it remains liquid at low temperatures, it is of course safe to use in the radiator. MOTOR AGE has always been in favor of a straight mixture of alcohol and water. Glycerine is rather expensive and other patented compounds often corrode the radiator so that when a leak develops it cannot be repaired and a new radiator must be purchased.

In other words it is cheaper to use alcohol than it is to buy a new radiator. The only possible question we see is that at approximately zero the compound might get slushy and prevent free circulation of water through the cooling system. In the article quoted, it does not state whether the car in question had a thermosyphon cooling system or one in which the water was circulated by means of a pump.

If this compound were used in a thermosyphon cooling system it might be possible that the mixture would become slushy in the radiator and prevent circulation through the engine. Then if the engine were started up and run it is possible that overheating might be experienced while the radiator was still cold and preventing circulation. This is just a theory, of course, as we have no definite information, but would be a point to watch out for in making the test.

SERIES PARALLEL SYSTEM OF WIRING HEAD LAMPS HAS BEEN USED MANY YEARS

Q.—Advise if you know of any pattern of single switch for the lighting system of an automobile that does not use resistance wire for dimming and does use a single wire system with one bulb in each headlamp. In other words, is there a system where the bright and dim lights are obtained from the same bulb by wiring first in parallel and then in series? If there is no such system please advise if this could be done and the economy and advantages it would give.—Fernando Garcia, New York City, N. Y.

A.—The series parallel system of dimming has been used for a good many years. On the 1916-17 and some of the 1918 Chevrolet cars this method was used and you can get a Chevrolet switch which can be used for series parallel dimming. In the parallel position current from the battery goes out to both bulbs while in the series position which gives the dim light it goes first to one bulb and then to the other. This same system was at one time used on Kissel cars and is the most efficient system there is as far as conservation of battery current is concerned. One disadvantage is the complication in the wiring while another is the fact that if one bulb is burnt out you cannot turn your lights on in the dim position.

Mathematics Applied to a Motor Boat

Q—We intend using a Ford generator and cut-out in connection with a standard six-volt battery and regular automobile lights on a small boat. The generator is to be belt driven off of the flywheel of the engine, which is an old stationary type. As we do not know either the engine speed or the speed at which the generator should run to deliver maximum current, we are unable to figure the proper size pulley for the generator. Can you figure this out for us from the following information:

[Motor Age Note—The illustration shown is the best interpretation we could make of the description now to be given.]

We cannot get the engine speed for the reason that the clutch control rods enter the crankshaft at the ends, so that we cannot get a speed indicator on the shaft. It is, moreover, the only rotating shaft on the engine. The water pump is belt driven through a lineshaft, which is belt driven from a pulley on the engine crankshaft. The engine or driving pulley is 1 ft. 8½ in. in circumference. The lineshaft or driven pulley is 5 ft. 10 in. in circumference. The line shaft speed is 80 r.p.m. The engine flywheel is 13 ft. 9 in. in diameter.

From this information can you tell us the proper size generator pulley to use? If driving directly off of the flywheel would make the generator pulley too large, we would like to have you figure out size pulley to use by driving from engine flywheel to another lineshaft and from this line shaft to the generator.—J. N. Green Motor Sales & Service Co., Metropolis, Ill.

In figuring out this problem the first thing to do is to find the ratio between the engine speed and the lineshaft speed and this will be inversely proportional

to the pulley ratio. We accordingly get the pulley diameter into feet. Ten in. equals .833 ft., while 8½ in. equals .7 ft. approximately. We accordingly divide 5.833 by 1.7 and find the answer to be 3.43. In other words the engine is turning roughly 3 1/3 times as fast as the lineshaft. We now multiply 3.43 by 80 and find that the engine speed is approximately 275, which is of course also the speed of the flywheel.

From data on the Ford generator we find that 1500 r.p.m. will give the maximum output and the next thing to do is to find the ratio between the generator speed and the engine speed. To do this we divide 1500, which is the generator speed, by 275, which is the engine speed, and find the ratio to be 5.45. In other words, the pulley on the engine must be roughly 5½ times as big as the generator pulley. We now take the circumference of the flywheel, which is 13 ft. 9 in., or 13.75 ft., and divide that figure by 5.45. This gives 2.52 as the circumference of the generator pulley in feet.

To change this to diameter we divide by 22 sevenths or multiply by 7/22, which gives .8 ft. as the proper diameter for the pulley on the Ford generator. Changing this to inches gives 9.6 in. as the diameter of the pulley on the generator. As it is permissible to have a speed in excess of 1500 r.p.m. even up to 2000 r.p.m. we can say that the diameter of the pulley should be 9 in. or even 8 in. if a 9 in. pulley is not available. From our calculations, how-

ever, the 9 in. pulley would apparently be the best one to use.

In making an installation of this kind provision should be made for lubricating the pulley bearing, that is, the bearing at the drive end of the generator. In normal operation on a Ford car this generator is lubricated by the splash at the front end of the crankcase so that driving it out in the open some method must be provided for giving it the necessary lubrication. The side pull produced by the belt tension will also necessitate very good lubrication.

WHEN THE REPAIRMAN IS LIABLE

Q—A gentleman brought his car in our garage, spoke to a tenant in here who buys and sells cars, borrowed \$5 and left his car as security. The garage puts a transient tag on it. We dismantled car. He came thirty days later and we assembled his car to his satisfaction. He took it out, paid storage, but did not authorize us to repair car. We gave him a full overhaul and did not charge him for it. Now he claims that we did not repair his car right. In the meantime the man that loaned him the \$5 discontinued business with us and we cannot locate him.—Aar Garage & Battery Co., New York, N. Y.

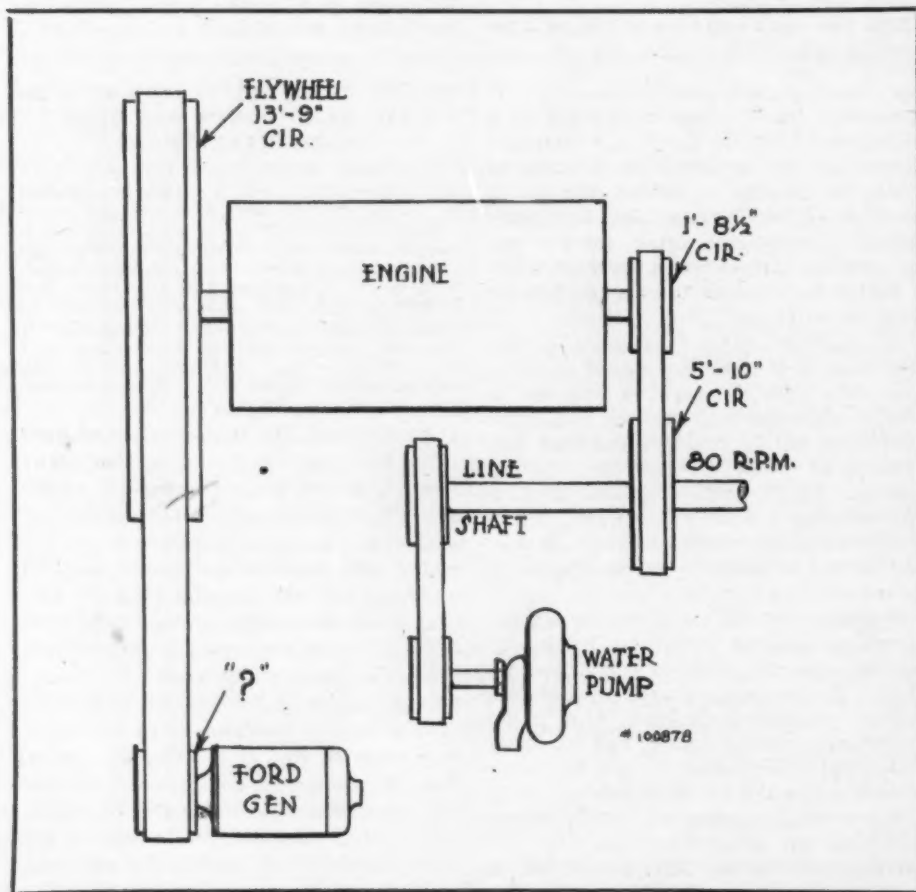
You have no right to repair a car stored in your garage without authorization from the proper person, and you could not collect for such work and repairs. Of course, if the owner should later promise to pay, or otherwise ratify and O.K. what was done, he could be held for charges. But where you proceed without authorization to repair or overhaul a car, you will be required to use ordinary care in so doing, and if you damage the car in the overhauling and repairing, you may be held liable for such damages. Of course, whether a car has been damaged is a question of fact to be determined by a court or jury where the parties themselves cannot come to an agreement.

Now, if you overhauled his car with his knowledge and assent, and your letter shows he assented; and further, if no charges were made, you could only be held for gross negligence in the performance of the work.

READER WANTS BRADLEY SPECIFICATIONS

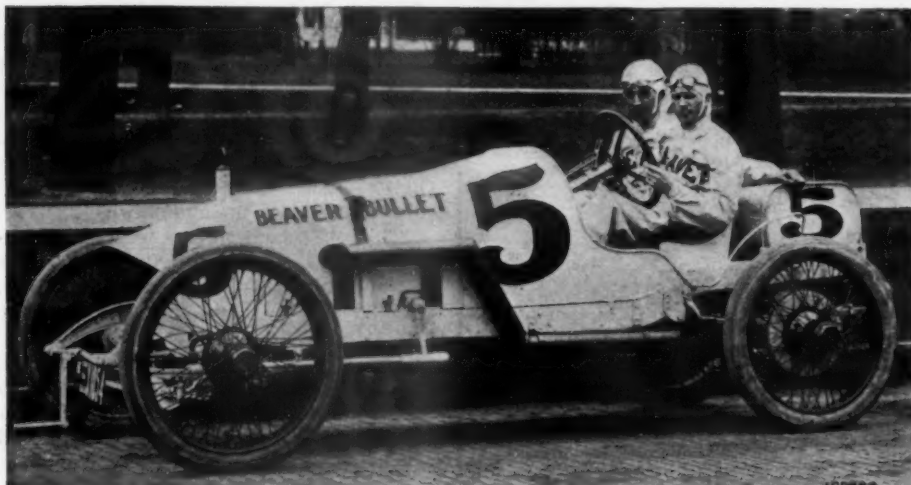
Q—Supply all available information on Bradley specifications and frame that was put out in 1921 in Cicero, Ill.—W. F. Brien, Des Moines, Iowa.

The Bradley is no longer manufactured but during the time when it was produced it was manufactured in a five passenger touring model, carried a 3½ by 5, four cylinder engine manufactured by the Lycoming Engine Co. The car was equipped with Westinghouse starter and generator and carried Connecticut ignition. A Carter carburetor was fitted and the Borg & Beck clutch was connected to a Grant Lees transmission. The battery was manufactured by the Exide Company and the bodies were manufactured by the Bradley Company. No information is available on the manufacture of the frame.



Figuring pulley size for generator drive

A Racing Car of Yesterday



Q—Who built the Beaver Bullet driven by C. F. Keene in the Indianapolis race of 1914, and what kind of an engine did it have? Also publish cut of the car if possible. W. L. Wieder, Denver, Colo.

1—The Beaver Bullet was built by Charles L. Rogers and Charles F. Keene

for the Beaver Automobile Co., of Beaver Falls, Pa. It was equipped with a Wisconsin motor, made by the Wisconsin Motor Manufacturing Co., Milwaukee, Wis. A picture of this car is shown in accordance with your request.

WHAT KIND OF RHEOSTAT TESTS A GENERATOR?

Q—I would like to make a rheostat for testing generators, starting motors, and coils. This will be used in a small electrical room which I have just built. The source of supply will be 110 volt D.C.

1—We do not quite understand your request, as a rheostat is not ordinarily used for testing generators, starting motors and coils. If you refer to a rheostat to be used in connection with a 110 volt D. C. motor which will be your driving motor, that is another question. Here also we would have to know the size of the motor and the current used in the armature and fields. One way to control the speed is to have a fairly heavy rheostat in series with the armature and you add resistance when you want to slow down the motor.

Another way is to have a finer rheostat made of smaller wire and of higher resistance and put it in series with the fields. A rheostat of this kind is used to increase the resistance to get higher speed. It would, however, be rather difficult to tell you the exact kind of rheostat to use without knowing all of the motor characteristics, and you can probably pick up a rheostat that will be suitable and also more satisfactory than one you would make. If you really mean to use the rheostat in connection with the generator, starting motor or coil test we hardly know what test you refer to. A heavy carbon plate rheostat is often used in checking up a battery, it being used to draw a heavy current from the battery.

Generators are tested by sending the current they generate into a battery. Ignition coils are tested by using battery current and an interrupter and a spark plug. Starting motors are often

tested by just connecting to a battery to see if they speed up and draw a comparatively low current. We are glad to give you all possible information but would ask that you be more specific as to the way in which you want to use this particular rheostat.

2—Publish wiring diagram of model K-1920 Buick Six.

2—We are showing wiring diagram in accordance with your request.

3—In the November 30th issue of Motor AGE we notice where the Deig Service Garage, Mt. Vernon, Ind., have a question in regard to magneto trouble. We had a similar experience with a 1918 Haynes about a month ago. This car had just been overhauled and after running about one month the engine suddenly stopped one day while running at a speed of about 30 m.p.h.

After trying about 10 minutes the owner succeeded in starting the engine and it ran 3 miles and then stopped again. After

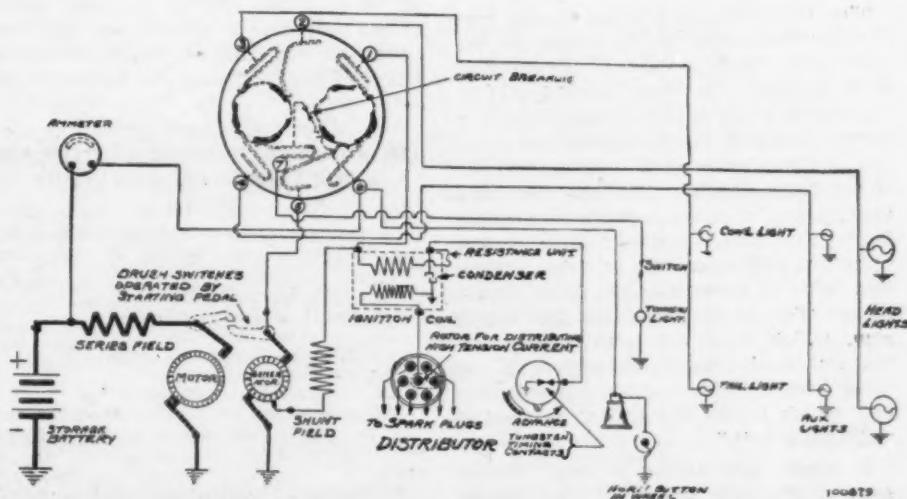
trying about half an hour the owner again succeeded in starting the engine and ran it as far as our shop where the engine was stopped. When I tried to start the engine I could not do so, and on looking at the interrupter and checking it up found that it had slipped out of time. After properly setting the timing the engine ran O.K. for about ten minutes and then stopped. After carefully checking again I decided to remove the timing gear cover.

To my surprise I found the four cap screws which hold the cam gear to the shaft had not been wired together with the result that they backed out and fell into the gear case. After replacing these cap screws the engine was O.K. I told this story to a few friends who laughed at me, but when the owner and two other parties verified the story I had the laugh on them.

3—To the best of our knowledge the ignition drive on this model Haynes is by means of bevel gears from the camshaft. Accordingly your explanation would be very plausible and the camshaft gear coming loose would allow not only the ignition but also the camshaft itself to be out of time. The running of the engine occasionally can probably be explained by the fact that the gear would slip around until it came to its normal position and then stick for a while. Then when it slipped the engine of course would stop, due to both the valves and ignition being out of time.

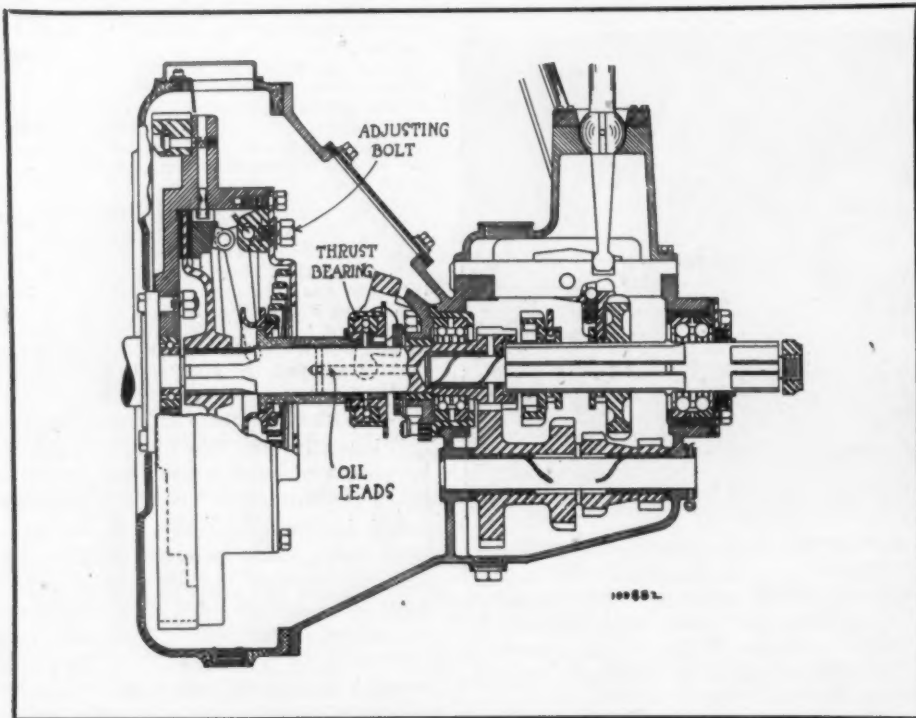
4—I also noticed the question of Paul G. Bergstrom of Normal, Ill., regarding oil pumping in a Ford engine. I have had quite a bit of success with the following simple method, and so far have not had a comeback. Remove No. 1 piston and drill six 3/32 inch holes at 45 degs. angle in the No. 3 ring groove. Chamfer the bottom edge of this groove with a file and replace the ring with a good oil sealing or oil wiping ring. I hope that these suggestions will prove valuable to some of your readers as some of theirs have proven to me. Frank L. Tighe, Baltimore, Md.

4—This method of preventing oil pumping is in line with recognized practice and should give good results. Motor AGE wishes to express appreciation for the above suggestions which should prove helpful to many of our readers.



Buick wiring diagram for 1918, 1919 and 1920 six cylinder cars

With Proper Assembly the Clutch Will Stand Up



Borg & Beck Clutch on Lexington

Q—We would like to see an illustration of the Borg & Beck clutch as used on a Lexington car model 6 S.X.S. serial No. 20153. This clutch was installed last June and ran until the last of November. It then burnt out the bearings and went all to pieces. In taking this clutch apart we found there were some parts missing and it looks to us as if it had been put together wrong, as nothing seems to be in its right place. We also found a pin about 5/16 in. in diameter by 1½ ins. long but can find no place where this pin belongs. Ross J. Frederick, Meco, N. Y.

1—We are showing an illustration which gives a section through the Borg & Beck clutch, also through the transmission as used on Lexington cars. At the extreme left you will notice the flywheel bolted to the flange of the crankshaft. In the center of the flywheel is a ballbearing in which the front end of the clutch shaft rests. The rear end of the clutch shaft is carried in the front bearing of the transmission.

The first thing that would be put into the flywheel after it is bolted to the crankshaft would be one of the circular friction discs. The next thing would be the driven plate of the clutch, which is shown mounted on the splined or front end of the clutch shaft. After this we would have another friction disc and against this a circular steel ring would bear. This ring is forced tightly against the outer Raybestos disc by three wedge-like affairs operating by three toggle arms. The outer portion of the toggle arm, which does not bear against the forward steel ring, is supported by another ring which in turn is held by a bolt which in the illustration is marked "adjusting bolt."

A heavy coil spring is seen resting against the rear cover of the clutch housing and pushing forward on a col-

lar which operates the toggle joint and exerts a wedge-like action so as to drive the driven disc due to the action of the friction discs. From the collar at the front end of this spring a sleeve will be seen extending back to another bearing which is labeled "thrust bearing," and the operation of the clutch pedal pulls this bearing backwards and by means of the sleeve compresses the spring and releases the action on the clutch.

Adjustment of the clutch is accomplished by removing the inspection plate and loosening both adjusting bolts, there being two, one at each side of the clutch. These bolts are then moved to the right to tighten the clutch or to the left to loosen it, and are again tightened when proper adjustment is secured. Care should be taken to see that both are tightened again after adjustments have been made. If the adjusting bolts come up against the end of the slot before proper adjustment is attained they can be taken out and set back into other holes so that additional movement is possible.

THE GROWLER'S POSSIBILITIES AND LIMITATIONS ON ARMATURE TESTS

Q—Describe test for locating the following faults by using an armature growler:

1. Open circuited winding
2. Short circuited winding
3. Reversed winding
4. Shorted commutator bars
5. Grounded armature
6. Grounded commutator

We understand that all of these defects can be located by using a growler but have never been successful on all of them.

1—We have seen armature testers advertised that claim to make the above

tests, but we are of the opinion that the tester included something beside a growler. The growler can be used for locating short circuits by taking a piece of hacksaw blade and holding it over the various slots in which the winding is placed. With a good armature there will be no attraction between the armature and hacksaw blade but with a shorted armature there will be a magnetic effect which causes the hacksaw blade to flutter up and down.

This will be true no matter whether the short is in the winding or whether it is between commutator bars and is the test to be made for your questions numbers 2 and 4. In order to tell whether the bars or the winding itself is shorted it is necessary to trace the winding and find which particular coil is giving the trouble and where the ends lead. It is then possible to disconnect the coil from the commutator bars and test the coil and commutator separately.

In locating open circuits, several methods are possible. Probably the best is to use a telephone receiver with the two ends touched at adjacent commutator bars while the armature is on the growler. A certain buzzing noise will be heard in the phone and, if at any pair of bars this is abnormally loud, it shows an open circuit. We do not know of the growler being suitable for locating grounds but these can be very easily located with 110 volt test lamp. Here again, if a ground is found, it is not known whether it is in the commutator or the winding unless the winding would be entirely disconnected.

In order to locate a reversed coil it seems to us you would have to use a compass and send current through one coil at a time by making connection to adjacent commutator bars and working gradually around the commutator at the same time checking the magnetic effect with a compass. Here again a knowledge of the armature winding would be essential in order to get accurate results.

2—Where is it possible to obtain a North East Service Manual? We have written to the North East Factory several times but have not received a reply from them.

2—We would suggest, inasmuch as you live in Los Angeles, that you get in touch with the official North East Service Station, the Electrical Equipment Company, 1240 S. Hope Street, Los Angeles, Calif., as they are supposed to carry these manuals in stock and sell them for \$5.00.

3—Can you suggest any way to eliminate the brush arc on Simms generators used on Maxwell and Rickenbacker cars? We have had considerable trouble on generators of this type, due to the brush holders melting out and springs losing their tension; also, due to solder being thrown from the commutator.—R. A. Parker, Los Angeles, Cal.

3—We understand that trouble of this kind is due to the use of a brush made of material which is somewhat too soft. We would accordingly suggest your getting in touch with Brown-Caine at Los Angeles, as they are special service representatives for Simms generators.

The Best Regulator for the Job

Q—Could you suggest a new or more satisfactory method of regulating the output of a 12 volt USL four brush generator, than the carbon pile regulator used with that system? This question refers to a 4-cylinder Jeffery car. We have tried a Briggs & Stratton universal cutout and regulator but the regulator points burn out quickly, due to the generators' heavy voltage and the makers do not recommend their universal cutout for this particular generator due to generators' high voltage.

1—The combination cutout and regulator to which you refer is probably unsuitable, not on account of the voltage but on account of the heavy current carried in the shunt field of the generator. This current is so heavy that it overloads the contacts and naturally burns them out quickly. We do not know of any regulator that can be used in place of the carbon pile. However, if the car is driven by someone who is fairly careful and will watch the ammeter to see that the charging current does not exceed 15 or 18 amperes it will be possible to make a sort of rheostat as shown in the illustration.

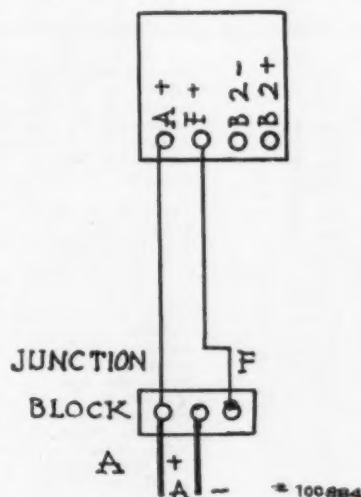
At the left the regulation circuits are shown, where current from the A plus terminal on the junction block on top of the flywheel housing goes up to the A plus terminal on the combination cutout and regulator. The connection from the A plus to the F plus terminal on the regulator is normally through the carbon pile which you claim is causing the trouble. At the right in the illustration we have shown an ordinary two gang lighting switch on the back of which two resistance coils are connected. The wire for these resistance coils should be heavy enough to carry the field current of the machine without seriously overheating.

To determine the proper length is a matter of experiment and one coil should be made twice as long as the other. With both of the buttons on this regulating switch pushed in, the two resistance coils will be shorted out and the current from the A plus terminal will go directly to the field without being limited in any way. As the car speed increases, the charging current will become too great and it will be necessary to pull out one or both buttons. A slight effect will be noticed by pulling out the left button. A greater effect will be noticed by pulling out the right button, while a still greater effect will be experienced by pulling both buttons out.

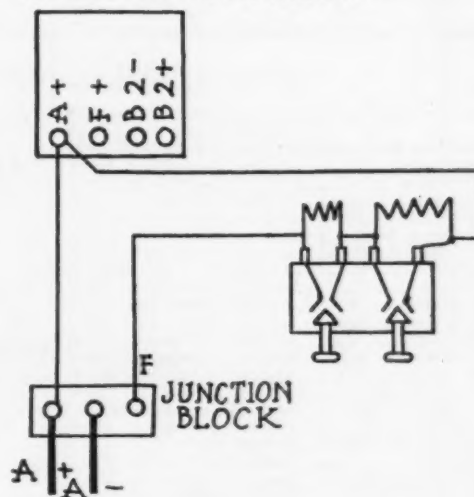
German silver wire would be suitable for this purpose and if this is not available iron wire can be used, although it is not so satisfactory. This is due to the fact that the resistance of iron wire increases as it gets hot.

It is, of course, possible that you can get the standard regulator to work well if you will occasionally clean up the carbon disks. These are cleaned up by removing and rubbing gently on fine sandpaper so as to remove the glazed

REGULAR WIRING USING CARBON PILE REGULATOR



CARBON PILE REGULATOR REPLACED WITH TWO GANG SWITCH AND RESISTANCE COILS



On a U. S. L. System the Carbon Plate Rheostat May Be Replaced With This Home-Made Rheostat

surface which interferes with their proper operation.

2—What would be the most economical and satisfactory remedy for a valve seat which is very badly worn down and out of shape on a 1916 five passenger Hupmobile? The engine in this car has a 3 1/4 by 5 1/2 in. stroke and the serial number is 63630. How would an over-sized valve be? Could you suggest such a valve, giving size and particulars regarding same if you think it satisfactory? —A Nebraska Reader.

2—An oversized valve would doubtless take care of the trouble. If it is the exhaust valve that is giving the trouble,

you can doubtless replace this one valve, but if the intake valve seat is at fault it would be best to put in oversize valves in each intake valve seat. If only one intake valve should be oversized you would doubtless have trouble due to one cylinder receiving a heavier charge of fuel than the others. The standard Hupmobile valve for this model has a head 1 1/8 inches in diameter. The stem diameter is 3/8 inches and the overall length is 7 9/16 inches. Name of concern that can supply oversize valves will be given by letter.

ADDING A CONDENSER DOES NOT OVERCOME ACTION OF ONE THAT IS SHORTED

Q—If an ignition system has a shorted condenser in it, will it give satisfactory operation to connect another condenser without removing the first one.

1—A shorted condenser allows the current in the coil to keep on flowing even when the interrupter points open; as the addition of a second condenser does not eliminate this leakage path for the current it will not stop the flow in the primary coil. The second condenser will therefore, do no good unless the defective one is disconnected. If condenser trouble, however, is due to an open circuit or poor connection a new condenser can be added without the necessity of removing the old one.

2—What weight and base (paraffine or asphaltum) oil is best suited for a Knight motor, and what if any are the winter troubles which are different in a Knight engine as compared with a poppet valve engine?—The Parkhouse, Grand Rapids, Mich.

2—One maker of Knight engines recommends the equivalent of Mobile B. B. for summer use and the equivalent of Mobile A for winter. The chief difference between the Knight motor and the

poppet valve type is the additional frictional drag of the sleeves produced in winter when the oil congeals. It is therefore, quite essential to use an oil which does not thicken to any extent at low temperatures. Aside from this we see no essential difference between the operation of the two engines in cold weather.

WIRING OF COMMONWEALTH AND PARTIN PALMER

Q—We have a 1916 Commonwealth Partin Palmer, using a model A-25 Apeldo motor generator, and would like to have a wiring diagram.

1—We have no data available on the wiring of either the Commonwealth or Partin Palmer cars using an Apeldo system. A wiring diagram, however, of the Splittorf-Apelco system as used on a 1916 Pullman was given on page 46 of the November 16th issue of Motor AGE. As it is possible you have mislaid your November 16th copy, we are sending you this diagram by mail.

2—Advise where parts for these cars may be secured?—Abernathy & Earl Garage, Warren, Arkansas.

2—This information will be given by letter.

COMING MOTOR EVENTS

AUTOMOBILE SHOWS

Cleveland, O.	Annual Winter Show, Cleveland Automobile Manufacturers and Dealers Assn.	Jan. 20-27
Reading, Pa.	Annual Automobile Show	Jan. 20-27
Milwaukee	Annual Automobile Show	Jan. 20-27
Baltimore	Annual Automobile Show	Jan. 20-27
Detroit	At the Municipal Garage	Jan. 20-27
Montreal	National Motor Show of Eastern Canada	Jan. 20-27
Scranton, Pa.	Annual Automobile Show	Jan. 23-27
Middletown, Conn.	Annual Automobile Show	Jan. 24-27
Chicago	Annual Show at Coliseum, N. A. C. C.	Jan. 27-Feb. 3
Chicago	Annual Automobile Salon	Jan. 27-Feb. 3
Binghamton, N. Y.	Annual Automobile Show	Jan. 29-Feb. 3
Ann Arbor, Mich.		Jan. 29-Feb. 3
Wilkes-Barre, Pa.	Annual Automobile Show	Jan. 29-Feb. 3
Wilmington, Del.	Annual Automobile Show	Jan. 29-Feb. 3
Middletown, N. Y.	Annual Automobile Show	Jan. 30-Feb. 3
Portland, Ore.	Annual Automobile Show	Feb. 3-10
Allentown, Pa.	Semi-Annual Automobile Show	Feb. 3-10
Pittsburgh	Annual Automobile Show	Feb. 3-17
Minneapolis, Minn.	Annual Show	Feb. 3-10
Troy, N. Y.	Annual Automobile Show	Feb. 3-10
Winnipeg, Man.	Annual Automotive Equipment Show	Feb. 5-10
Charlotte, N. C.	Annual Automobile Show	Feb. 5-10
Lansing, Mich.		Feb. 5-10
Toledo	Annual Automobile Show	Feb. 5-10
Winnipeg, Man.	At Minto Barracks	Feb. 5-12
Waterbury, Conn.	Annual Automobile Show	Feb. 5-12
Galesburg, Ill.	Annual Show	Mar. 6-10
Cincinnati	Automobile Show	Feb. 7-14
New Brighton, Pa.	At Junction Park	Feb. 7-14
Kewanee, Ill.	Kewanee Automobile Dealers' Assn.	Feb. 8-10
Kansas City, Mo.	Annual Automobile Show	Feb. 10-17
St. Louis	St. Louis Automobile Dealers' Assn.	Feb. 10-17
Rochester, N. Y.	Annual Automobile Show	Feb. 10-17
Norfolk, Va.	Annual Automobile Show	Feb. 12-17
Kalamazoo and Flint, Mich.		Feb. 12-17
Utica, N. Y.	Annual Automobile Show	Feb. 12-17
Dallas, Texas	Dallas Automobile Trades Assn. Show	Feb. 12-17
Flint, Mich.	Flint Dealers' Assn.	Feb. 12-17
Fort Dodge, Ia.	Annual Automobile Show	Feb. 13-16
Orlando, Fla.	Annual Automobile Show	Feb. 13-17
Sioux Falls, S. D.	Annual Automobile Show	Feb. 14-17
Ottawa, Canada	Show	Feb. 15-17
Columbus	Annual Automobile Show	Feb. 15-21
Hartford, Conn.	Annual Automobile Show	Feb. 17-24
Atlanta	Annual Automobile Show	Feb. 17-24
Akron, O.	At Central Garage	Feb. 17-24
San Francisco	Exposition, Auditorium	Feb. 17-24
Sioux City, Ia.	Sioux City Automobile Dealers' Assn.	Feb. 17-24
Salt Lake City	Annual Automobile Show	Feb. 19-29
Grand Rapids, Mich.		Feb. 19-24
Mt. Clemens, Mich.		Feb. 19-24
Louisville	Annual Automobile Show	Feb. 19-24

White Plains, N. Y.	Annual Automobile Show	Feb. 19-24
Schneetady, N. Y.	Annual Automobile Show	Feb. 19-24
Springfield, O.	At Memorial Hall	Feb. 19-25
Bethlehem, Pa.	Annual Automobile Show	Feb. 19-Mar. 1
Trenton, N. J.	Annual Automobile Show	Feb. 21-24
Springfield, Ill.	Springfield Automobile Dealers' Assn.	Feb. 22-24
Brooklyn, N. Y.	Annual Automobile Show of the Brooklyn Motor Vehicle Dealers' Assn.	Feb. 24-Mar. 3
Youngstown, O.	Youngstown Automobile Dealers' Assn.	Feb. 24-Mar. 3
Albany, N. Y.	Annual Automobile Show	Feb. 24-Mar. 3
Des Moines, Iowa	Annual Show	Feb. 25-Mar. 5
Muskegon, Mich.		Feb. 26-Mar. 3
Syracuse, N. Y.	Annual Automobile Show	Feb. 26-Mar. 3
Springfield, Mass.	Annual Automobile Show	Feb. 26-Mar. 3
Omaha	Annual Automobile Show	Feb. 26-Mar. 3
Yonkers	Annual Automobile Show	Feb. 26-Mar. 3
Oklahoma City	Annual Automobile Show	Feb. 26-Mar. 3
Portland, Me.	Annual Automobile Show	Feb. 26-Mar. 3
Evansville, Ind.	Annual Automobile Show	Feb. 26-Mar. 3
Malone, N. Y.	Annual Automobile Show	Feb. 28-Mar. 3
Poughkeepsie, N. Y.	Annual Automobile Show	Feb. 28-Mar. 3
Mankato, Minn.	Mankato Automobile Assn.	Feb. 28-Mar. 4
Indianapolis	Indianapolis Trade Association	Mar. 5-10
Bay City, Mich.		Mar. 5-10
Amsterdam, N. Y.	Annual Automobile Show	Mar. 5-10
Carlisle, Pa.	Chamber of Commerce Show	Mar. 5-10
Nashville, Tenn.	Annual Automobile Show	Mar. 5-11
Saginaw, Mich.	Annual Automobile Show	Mar. 7-11
Elizabeth, N. J.	Fifth Annual Show	Mar. 8-17
Huntington, W. Va.	Huntington Automobile Dealers' Assn. Show	Mar. 10-16
Richmond, Va.	Annual Automobile Show	Mar. 10-17
Boston	Annual Automobile Show	Mar. 10-17
Newark, N. J.	Annual Automobile Show	Mar. 10-17
Washington, D. C.	Spring Show, Convention Hall	Mar. 11-17
Port Huron, Mich.		Mar. 12-17
Battle Creek, Mich.		Mar. 19-24
Greenville, S. C.	Annual Automobile Show	Mar. 28-31
Denver	Municipal Auditorium	Mar. 11-18
Alpena, Mich.		Apr. 2-7
Green Bay, Wis.	Annual Automobile Show	Aug. 27-30
Sacramento	Annual Automobile Show	Sept. 3-8
Memphis	Annual Automobile Show	Sept. 28-30
Fresno, Calif.	Automobile Show	Sept. 28-Oct. 5
Little Rock, Ark.	Annual Automobile Show	Oct. 8-13
Waco, Texas	Waco Automobile Dealers' Assn.	Oct. 20-Nov. 5

CONVENTIONS

Chicago	Annual Meeting, Automotive Electric Service Association	Jan. 29-31
Quincy, Ill.	Annual Meeting Illinois Automotive Trade Association	Mar. 19
Olympia, Wash.	Convention Washington Automotive Trade Association	July

RACES

San Diego, Calif.		January
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SQUEEKS & RATTLES

If You Know Any, Tell Them to Us

A FEW NEEDS OF THE AUTOMOTIVE INDUSTRY AND TRADES

(According to R. L. Miller)

Mechanics with universal joints in their arms, legs, neck and back.
A "Kil-Nock" solution for certain class of owners.
An automatic powder puff for the woman driver.
A cooling system for the tires in hot weather.

M. C. V. says six red-headed girls remind her of the Auburn Six and wants to know if a sheet of paper makes you think of another make of car.

Says J. D. Keith in his letter, "I notice you are hollerin' for help for Squeeks & Rattles and am enclosing a few which you might use"—then comes this:

"Keep your hands on the wheel
And your eyes straight ahead
There are those who didn't
But they are dead."

—Prest-O-Lite.

But the point to get in this is: we are hollerin' for help so speed it up and send us some stuff that will wake things up. Everyone—altogether, now, c'mon!

Q—If there is a little dew on the spark plugs, will it keep the engine from running?—Y. O. K.

A—Yes, and if there is too much dew on the car, the sheriff may keep it from running.

Life is just one long procession of bumps, but a sense of humor is a good shock absorber.

Tom Walsh rises to remark that he thinks we're going to get along nicely with all of the new correspondents, and is glad that the entire burden doesn't rest on him. We replied that he assumed too much, that we're getting lots of stuff that is just as good and better than his (Tom's an old-timer).

Girl in a Flivver,
Going like blazes,
Tickled all over at the dust she raises.
Lets go wheel,
To fumble in purse,
To take out her powder rag.
Good Night Nurse.—L. T. S.

Well, we didn't have any of the shows called off, but we had 'em shortened considerable.

The Coachbuilt
ANDERSON
 ALUMINUM SIX



The body frame is made of ash and oak cut from our own forests, air-dried for a year, then sawed (not bent) to shape and built into one wear defying unit.

SPECIFICATIONS:

Coachbuilt Anderson Aluminum Body; Six Cylinder, Red Seal Continental Motor; Westinghouse Starting, Lighting and Ignition; Borg and Beck Clutch; Cord Tires; Alemite Lubrication; Motometer; Snubbers; Wind Shield Cleaner; Foot Dimmer for Headlights. Wheelbase 115 inches. Average 19 miles per gallon of gas.

Coach

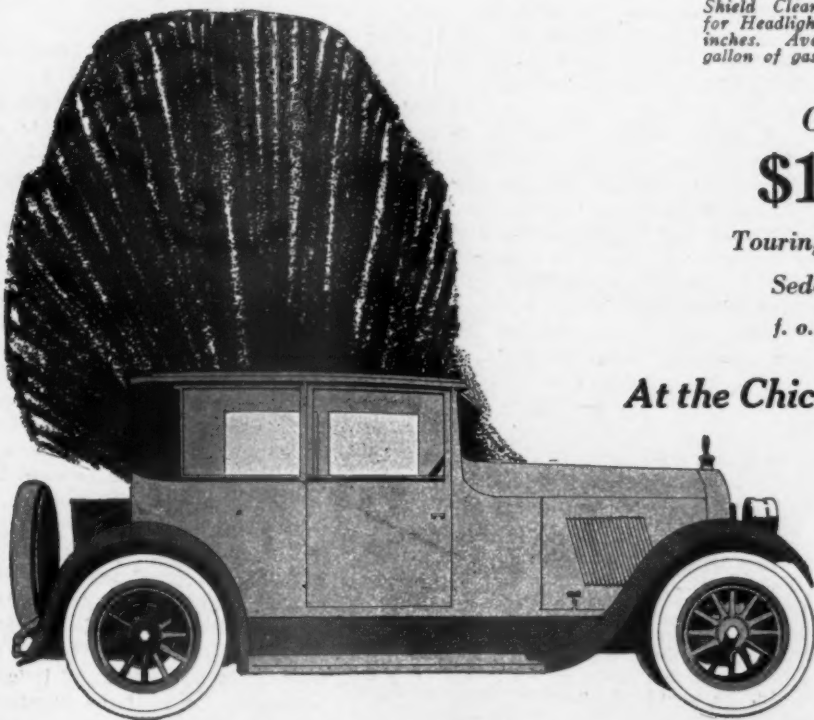
\$1450

Touring Car \$1195

Sedan \$1595

f. o. b. factory

**At the Chicago Show—
 of course**



**MORE THAN
 JUST A LIVING WAGE**

Write for details of the Anderson direct-with-
 factory contract with maximum discount.

Anderson Motor Co., Rock Hill, S. C.

Motor Trucks for Hauling Livestock

Figures on Livestock Received at the Kansas City Stockyards Show a Rapidly Developing Field for Truck Sales

DURING the past six years the motor truck has become an important factor in the transportation of livestock from the farms to the stockyards. In many ways it is a far more satisfactory method of shipping than the railroad and there is every reason to believe that the growth of its popularity for this purpose will continue. This means a fertile field for truck sales. The facts, as shown by the figures on livestock received at the Kansas City stockyards, are presented here, and the dealer may judge for himself whether or not he is getting his share of this new business.

Six years ago there were just two motor trucks making a special business of hauling livestock to the Kansas City stockyards. Today there are over 600 trucks making regular trips to the yards with loads of cattle, calves, hogs, sheep, mules and horses.

Double Deck Trucks Used

Some of these trucks simply bring in a few hogs or cattle while others are equipped with special bodies for hauling quite a number of animals. Several of the regular livestock trucks have double deck bodies for hauling hogs. These are capable of hauling 50 hogs. There is one truck which mounts a triple deck body for hogs and sheep.

During 1921 the total number of animals listed as "Driven In," which were received at the Kansas City stockyards, was 214,579. Up to December 5, 1922, this total had mounted to 282,529 for the year, with over three weeks to go. When one considers that about 97 per cent of the "Driven In" class are really hauled in by motor truck, he can get a better

idea of the magnitude of the business of hauling livestock to market.

In 1921 the receipts of driven in cattle at Kansas City were 14,911; calves numbered 22,291; hogs reached a total of 111,037 and sheep totaled 58,611.

In 1922 the cattle numbered 20,637, the calves 27,416, hogs had been hauled in to the number of 128,229 and sheep had jumped to 102,659. In 1922 there had been 3,588 horses and mules hauled in by truck up to December 5.

1922 Sets a Record

The 1922 business showed an increase of about 31 per cent over the 1921 hauling records, and 1921 was considered rather a banner year, too.

The stock is hauled to Kansas City over the roads of Kansas and Missouri from communities as far distant as 140 miles. The longest hauls are from the south, west and east. The shorter hauls from the north are due to the fact that there are extensive stockyards at both St. Joseph and Omaha which take care of much of the livestock in that section.

The advantages of shipping by truck are manifest for, even if the hauling charges are just as high or perhaps a little higher in some instances than they would be if the stock were shipped by rail, there is the advantage of getting the stock on the market early in the day before the yards become congested. The shrink in livestock is a bugbear among shippers, and this is cut down to a minimum when the stock is shipped by motor truck, for they are seldom on the road more than a few hours.

With radio communication so common on mid-west farms as it is today, the livestock farmer can get the latest mar-

ket reports on hogs or cattle in the late afternoon, load up his truck that evening and hustle his stock to market, should that market be favorable to him. The Kansas City Stockyards Company has instituted a night crew for unloading these trucks which make night runs with stock, and the animals are handled more quickly and better all the way around than those which are shipped in by rail.

The recent car shortage in the middle west has had a decided effect upon the number of animals which have been received at the yards by means of motor trucks. Many farmers who had never shipped by truck before have been forced to it this fall and winter because they were unable to secure cars. Once this method has been tried by a shipper, it is always followed.

Specialize on Truck Shipment

Several livestock commission firms at Kansas City have gone in for a special business on motor truck shipments of livestock. The King, Kannaly Co. is, perhaps, the largest among these special concerns, and is doing a splendid business.

All truck shipments consigned to this firm are taken into the yards, and the shipper is credited with the amount of the sale. The hauler is paid for his hauling and the remainder of the proceeds are turned back to the shipper the same day. There is no red tape nor long-winded procedure of spotting cars and are often confused by some clerk, and securing car initials and numbers which there are no delays in remittances. Shippers are served better and more quickly when they ship by truck and the business is growing.

License Lighting

Recently a joint committee of the Society of Automotive Engineers and the Illuminating Engineering Society met to see what could be done in the way of standardizing the method of illuminating license plates on motor cars.

It was the sense of this joint meeting that no specifications for lighting the registration plates can be satisfactorily applied unless there is a reasonable standardization of registration plates as regards

1. Maximum dimension of the area illuminated.
2. Design and spacing of digits.
3. Color contrast.

The joint committee further suggests that such standardization might be approximately as follows:

1. That the area to be illuminated be included in a rectangle no larger than 16x6½ in.

2. That the design and spacing of the digits be such that

(a) The stroke be not wider than ½ in.

(b) The spacing between strokes be not less than ½ in.

(c) That a space of not less than ¾ in. be provided between each third digit.

(d) The opening in such figures as 3, 5, 6 and 9 be cut wide so as to avoid confusion with each other or with figure 8.

(e) The color be so selected as to secure high contrast between the numerals and background.

A good many if not all of the states have on their statute books laws which require that the registration number plate carried at the rear of the car shall

be illuminated at night in such a manner that the number can be read by persons at a distance of 50 feet or more, but none of these laws have been enforced in the past. The lighting equipment carried on the great majority of the cars in use today is either inadequate or else so unfavorably placed that the amount of light falling on some parts of the plate is insignificant and it is absolutely impossible to read the number at night, especially with the car in motion.

In order to forestall any ill-considered legislation along this line, the attention of the S. A. E. and the Illuminating Engineering Society was called to the subject, and the committees of these two organizations dealing with motor vehicle lighting took up the matter and appointed the subcommittee to study the problems involved.



Vibration Eliminated

Heavy pistons cause vibration.

Built of the finest grained special analysis iron castings, Spencer-Smith Pistons are light in weight, yet sufficiently strong to withstand the terrific shocks of the explosions in the motor.

They are designed and balanced to eliminate vibration.

SPENCER-SMITH MACHINE COMPANY
HOWELL MICHIGAN

Largest Manufacturers of Pistons Exclusively

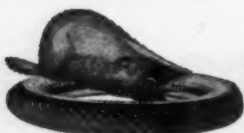
19



SPENCER-SMITH PISTONS

BADGER TIRES

CORD



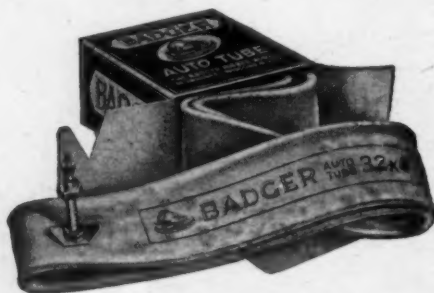
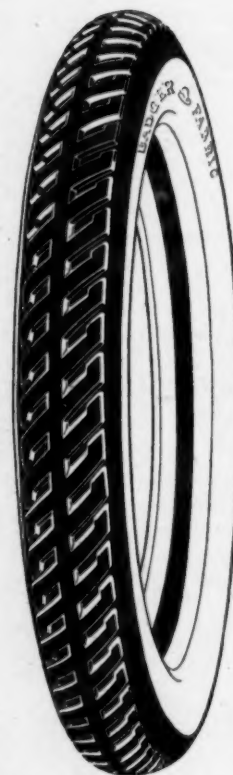
FABRIC

Badger Tires, in Cord and Fabric construction, are of the highest quality throughout.

Built by an old-established company, they represent the best and most up-to-date in modern tire production.

In Fabric construction the line includes the prevailing popular sizes—all standard sizes in passenger car Cord types, and the principal sizes in demand for commercial car or stage equipment.

Distributed through accredited jobbers only, it is a most attractive and profitable line for the Dealer, and highly satisfactory to the consumer.



Badger Tubes are made from the finest grades of pure rubber, of heavy gauge, and are unusually strong and serviceable. The line is complete in standard weights, extra heavy oversize for Cord Casings, and shaped or curved type in the principal sizes for Commercial Car use.

The success of the Badger line and policy is reflected in its acceptance by many leading Jobbers throughout the country.

THE BADGER RUBBER WORKS

MILWAUKEE

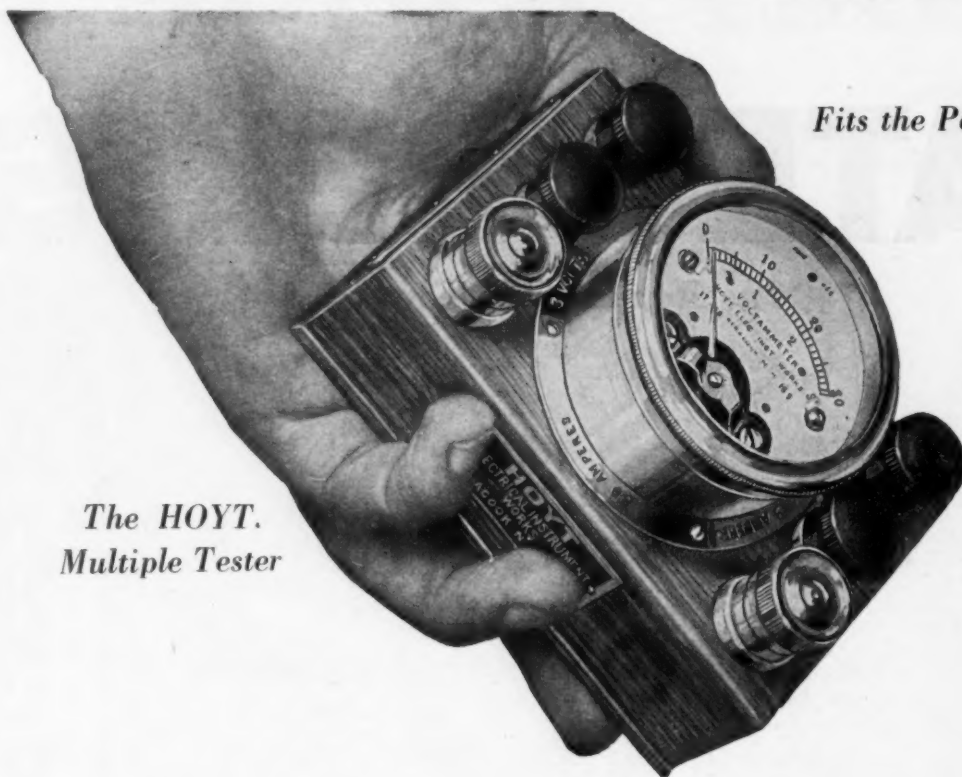
WISCONSIN

GATES BELTS

"The Standardized Fan Belt"

Ask your jobber
about the new
dealer prices on
Gates Vulco Cord
Fan Belt.

Made by the World's Largest
Manufacturers of Fan Belts.



Fits the Pocket!

*The HOYT.
Multiple Tester*

Can you keep six electrical instruments in your pocket?

Where do you keep those six or seven instruments when it is necessary to locate some electrical fault in motor car equipment?

Are they scattered all over the shop? Can you find the particular ammeter or shunt necessary to make the test?

How about the Voltmeter?

You know what it's like, looking the deuce knows where for the right instrument to make the test.

How convenient it is then, when you can dig down into your pocket and draw out your Hoyt Multiple Tester

—the instrument that will find any electrical trouble; telling you at a glance where the trouble is and what it's like.

This practical—though inexpensive and rugged—measuring device is not merely one of six different instruments—it's ALL SIX. And all six jobs are done in the most approved Hoyt fashion—which means with positive accuracy and accident-proof efficiency.

Ranges: 3 and 30 volts, 3 and 30 amperes, 90 Mil-volts. Find out more about this remarkable device.

THE BURTON-ROGERS COMPANY

Sales Department—Hoyt Electrical Instruments

755 Boylston Street, Boston, Mass.

Branch Offices and Distributors in All Principal Cities

**"The Well-Equipped Shop
Gets the Business"**





*Lighter and neater
than glass, and will
not break—the
BEST transparent
vizor.*

The G-G-H Premier Vizor "Triple-Curve"

The original, exclusive, "triple-curve" arch construction means:

1. **Strength**—a guarantee against warping, wrinkling, or sagging. The Premier Vizor weighs only 4½ pounds, and it will outwear your car.
2. **Beauty**—The Premier Vizor greatly improves the beauty of your car. Made with a strong, re-inforced aluminum frame, with panes of *genuine Du Pont Pyralin*. Brackets are black-enameled with nickeled trim.
3. **Utility**—A Premier Vizor is a necessity for night-driving as well as daytime use. Winter or summer, rain or shine, it prevents accidents by overcoming glare in any form.

Look at the picture above. The Premier Vizor is set low, just above the normal position of the driver's eyes. A car with dazzling headlights approaches. The driver simply straightens up in his seat—looks directly at the oncoming car whose lights, viewed through the ray-absorbing Pyralin, appear merely as mildly illuminated orbs, and drives past with the same accuracy and assurance as if it were broad daylight. That's Premier night-driving comfort!

Made in Green, Blue and Amber colors. One model fits all makes and models of cars, open or closed. You can install it in five minutes yourself, with no other tool than a screw-driver.

Retail Price

\$7.50

A cheaper but highly practical and serviceable Vizor is the low-priced G-G-H POPULAR. A triple-braced steel frame covered "drum-tight" with genuine Du Pont Fabrikoid. Cannot sag. Black outside, green underneath. Price \$3.50.

You'll want the G-G-H REELEX, too. A handy extension reel troublelight which can be carried to any part of the car, or, can be connected with any detachable spot-light. Price \$2.50.

You can get these G-G-H products from your accessory dealer—or if he hasn't them, we'll send postpaid on receipt of remittance and his name.

Grigsby-Grunow-Hinds Co.

906 W. Lake St.

CHICAGO, ILL.



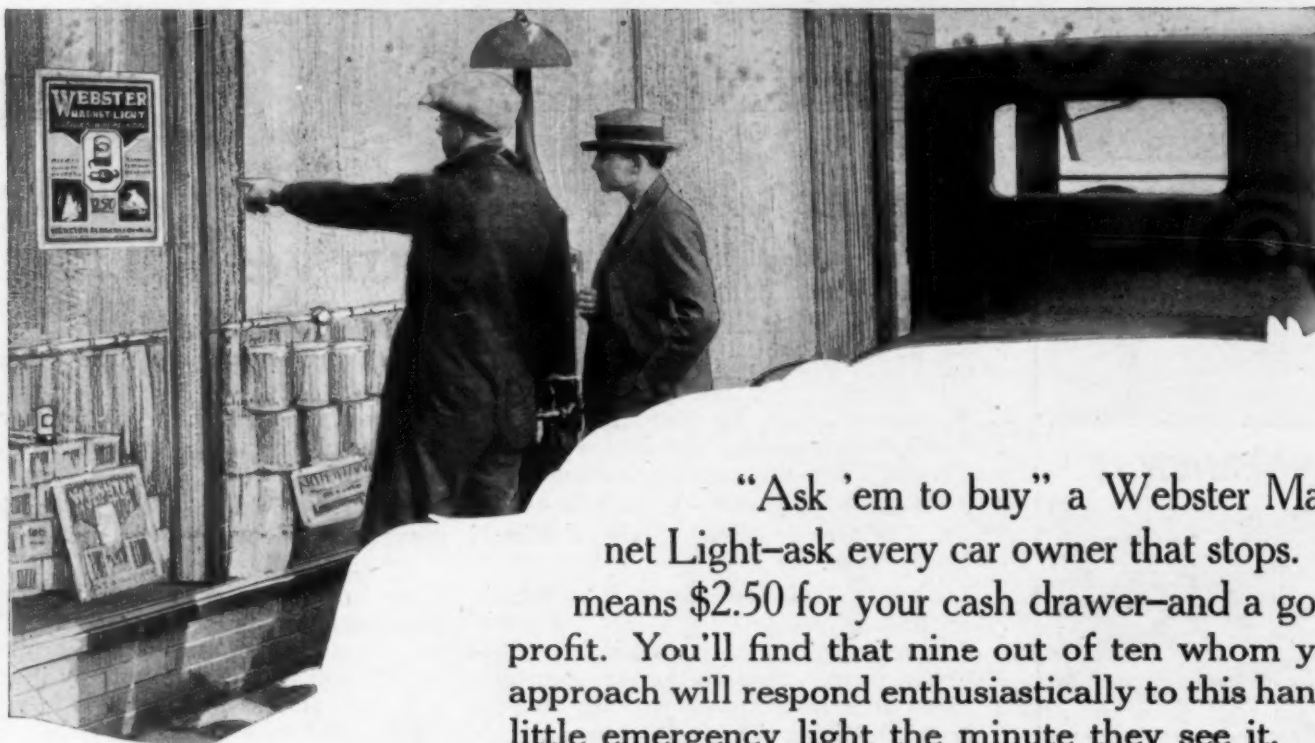
DEALERS:

Write for booklet and discounts, or ask your jobber.

WEB

MAGNET LIGHT

- STICKS WHERE STUCK



The Webster Magnet Light comes in a neat carton that needs no wrapping. Has 12 ft. of cord, nickel-plated reflector hood, and an electro-magnet base that sticks to any iron or steel surface. Plugs into any lamp socket on the car. Complete \$2.50.

"Ask 'em to buy" a Webster Magnet Light—ask every car owner that stops. It means \$2.50 for your cash drawer—and a good profit. You'll find that nine out of ten whom you approach will respond enthusiastically to this handy little emergency light the minute they see it. Its exceptionally low price makes it easy to turn the trick that brings in the cash.

Get a display carton of Webster Magnet Lights from your jobber at once and place them on your front counter. He'll also furnish you with attractive, sales-getting display cards for your store and window.

WEBSTER ELECTRIC COMPANY

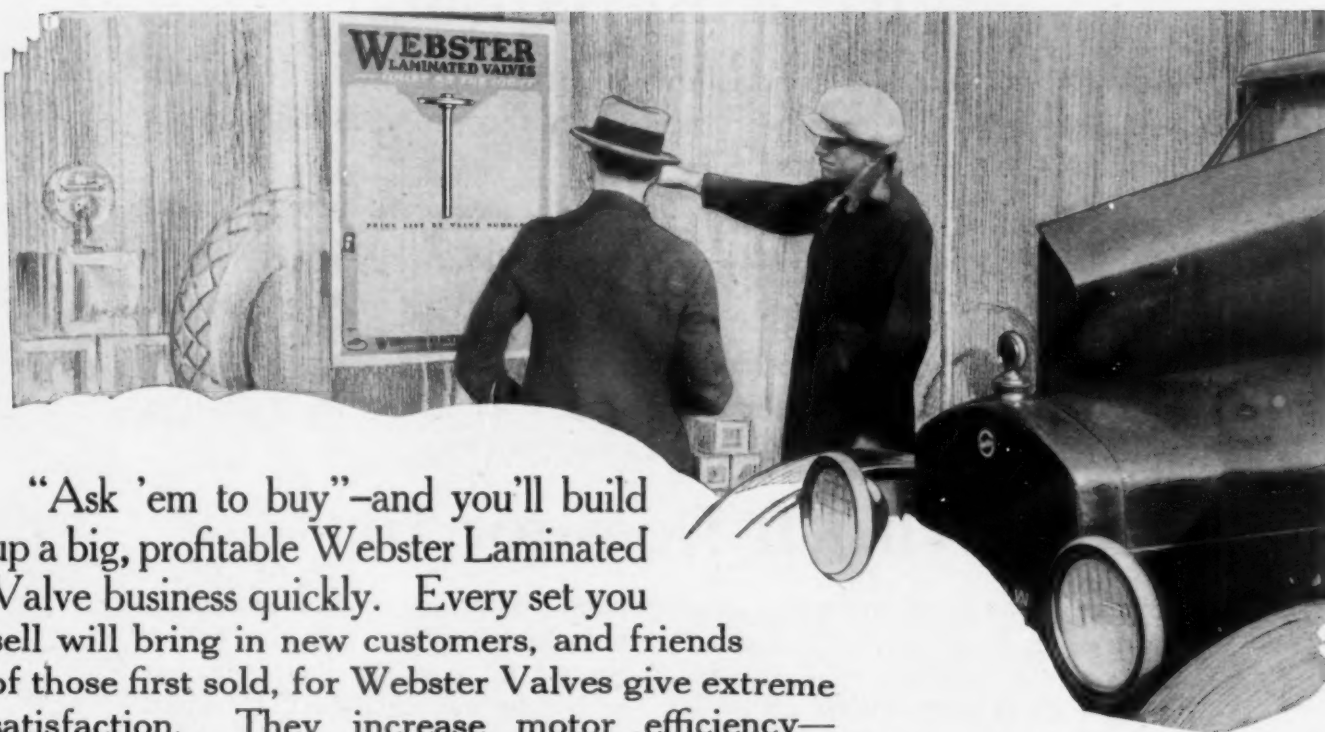
RACINE WISCONSIN U.S.A.

Manufacturers of Webster Laminated Valves, the Webster Magnet Light, and the Webster Magneto—three quarters of a million now in use.

STER

LAMINATED VALVES

— QUIET AS THE NIGHT



"Ask 'em to buy"—and you'll build up a big, profitable Webster Laminated Valve business quickly. Every set you sell will bring in new customers, and friends of those first sold, for Webster Valves give extreme satisfaction. They increase motor efficiency—entirely eliminate that metallic ring which accompanies ordinary valve action, increase power and compression, discourage warping and pitting, and entirely do away with the need of valve grinding. No other valves perform like Webster Laminated Valves for no other valves are constructed under exclusive patents, without which laminated valves cannot be properly made.

The head of Webster Laminated Valves is made of several laminations of special alloy steel that are locked to a 3½" nickel steel stem by the exclusive Webster swaging process. In this way head and stem are made one integral unit without destroying the flexing action of the laminations.

WEBSTER ELECTRIC COMPANY

RACINE WISCONSIN U.S.A.

Manufacturers of Webster Laminated Valves, the Webster Magnet Light, and the Webster Magneto—three quarters of a million now in use.



What Is Advertising?

Advertising is real salesmanship in print and a means by which the buying public can be educated to recognize a meritorious article as the leader in its field.

It is a means by which a quality product can gain preference in the minds of the buying public to a point that they purchase the article nationally advertised, knowing that they are getting the best.

An inferior article cannot stand to be nationally advertised with consistency and the dealer selling such an article is gambling with his biggest asset—*satisfied customers*.

What It Does for You

It helps in the distribution and selling of goods, provided that instead of dealing in generalities it is written in such a way as to create a desire to buy.

AC advertising is written for the benefit of the dealers, with this thought uppermost, and they will profit by it to the extent that they take advantage of it.

This advertising talks to thousands of motorists in your community, and every other community—now suppose it appeared over your own

name! Wouldn't you be enthusiastic? You can "sign" all this advertising and connect your business with it by having the AC transparency on your window, an AC Quick Seller on your counter and by making use of the other sales helps that we offer.

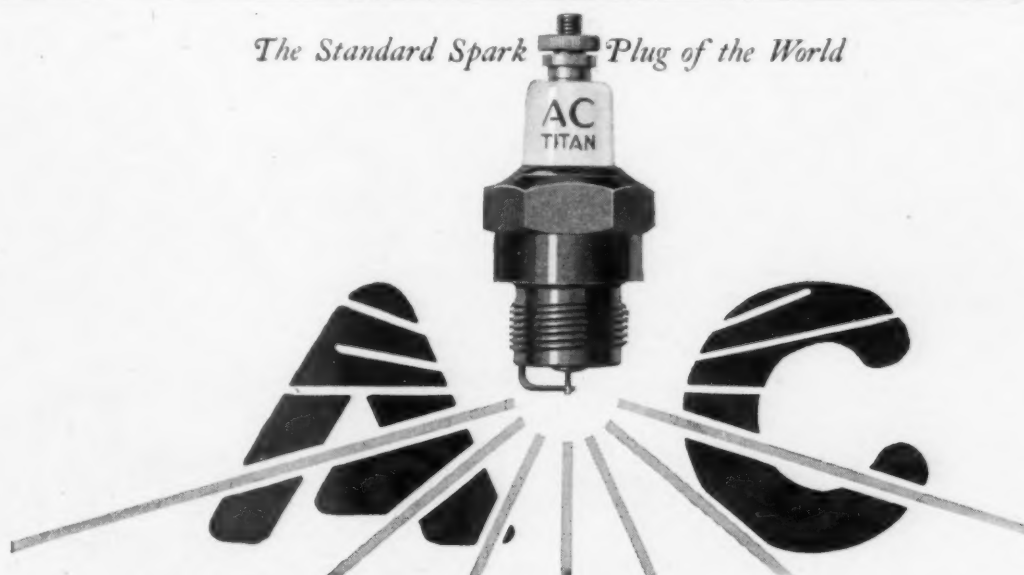
Read the opposite page which shows why AC is the plug with the greatest sales possibilities, both present and future. It is the best advertised, most profitable and easiest selling plug.

AC Spark Plug Company, FLINT, Michigan

U.S. Pat. No. 1,135,727, April 13, 1915, U.S. Pat. No. 1,216,139, Feb. 13, 1917. Other Patents Pending

Sell AC Spark

The Standard Spark Plug of the World



Just Consider How Many AC-Equipped Cars There Are in Your Locality!

Think of all the Chevrolets:

—of all the Buicks:

—of all the Dodge Brothers:

*—of all the Willys - Knights
and Overlands:*

—and of all the other cars: Apperson,
Cadillac, Chalmers, Chandler,
Cleveland, Cole, Dort, Durant,
Essex, Haynes, Hudson, Hupmo-
bile, Jewett, Marmon, Maxwell,
Mitchell, Nash, Oakland, Olds-
mobile, Paige, R & V Knight, Star
*—and more than three hundred ad-
ditional makes:*

—All AC-equipped

*—and already in use in your locality,
with the number growing every
day.*

This tremendous ready-made mar-
ket for AC's is right at your door,
*and will always be there in ever-
increasing size.*

In addition, think of all the Fords
that you can easily equip with AC

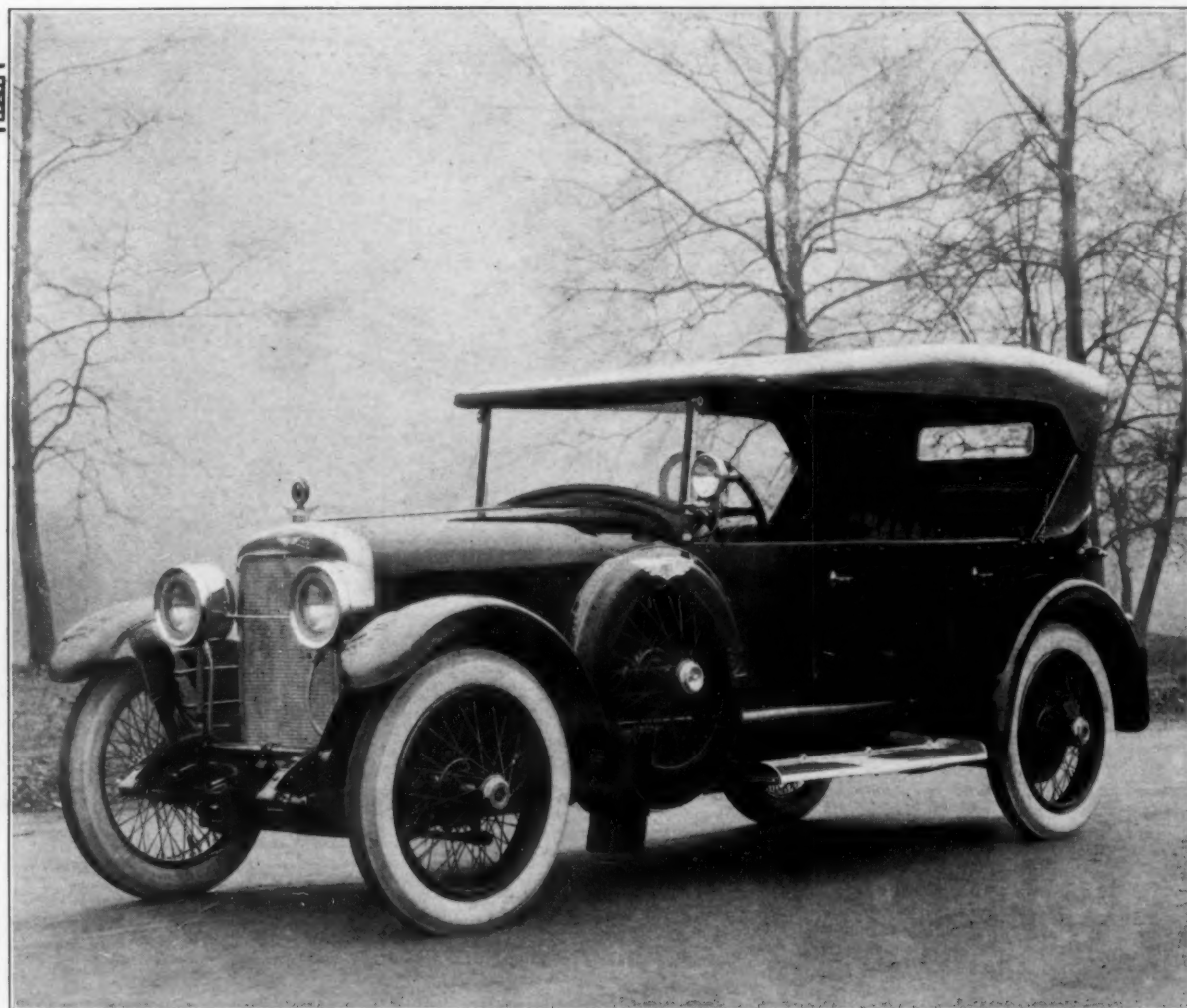
1075's—the plug especially designed
for the Ford engine by AC—the plug
that will make satisfied customers
for you and which carries a good
margin of profit.

Also in AC Carbon Proofs you have
the most successful plug ever de-
vised for motors that have a tendency
to foul the spark plugs.

Remember, too, that besides being
regular equipment on all of these
cars, AC's are heavily advertised—
that all the motorists in your locality
either use or know AC's by reputa-
tion and are glad to be able to get
them from you.

No other spark plug, it is evident,
can begin to offer you the selling
possibilities that AC's do. For vol-
ume, quick sale, rapid turnover,
liberal profit and satisfied customers
AC's lead the field.

Plugs by the Set



The NEW SIX

The powerful new H. C. S. Six adds another great advancement to the highly profitable business which H. C. S. dealers enjoy.

It is the kind of car you naturally expect from Harry C. Stutz, America's outstanding builder of fine cars.

At the New York Automobile show, it is conservative to state, the new Four and Six cylinder H. C. S. cars won the admiration of every motor car expert.

H. C. S.

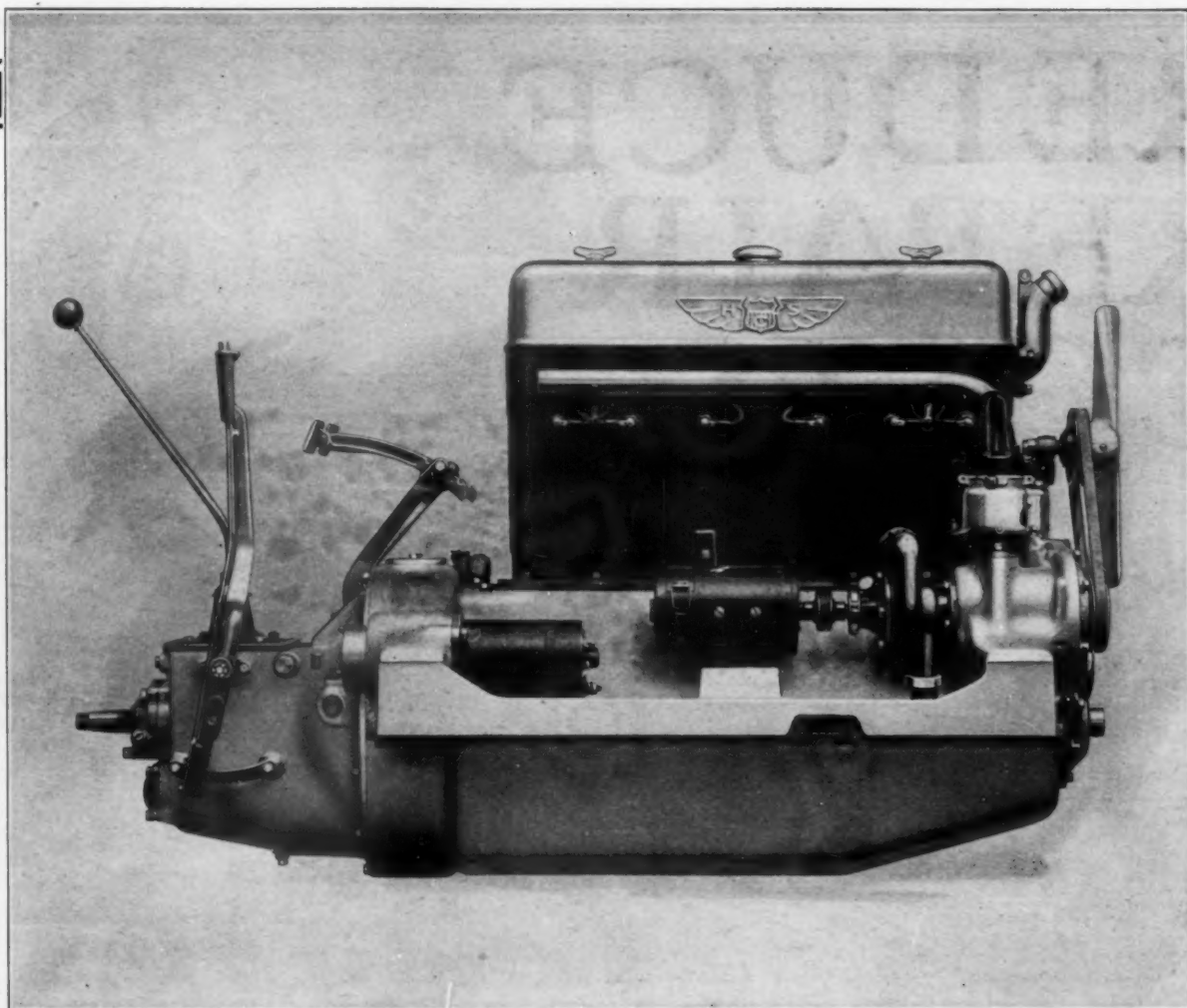
DESIGNED AND BUILT BY HARRY C. STUTZ
H. C. S. Motor Car Co., Indianapolis

SERIES IV

SIX TOURING, \$2650

FOUR TOURING, \$2250





by Harry C. Stutz

The strongest claim, we believe, that can be made for these new cars, is that they are the best cars ever built by Harry C. Stutz. In fact there are no better motor cars.

In keeping with the character of these truly wonderful cars, the H. C. S. business proposition to dealers includes those features which are essential to sound, permanent, profit:—liberal discounts, ample territory, and moderate investments. Write us.

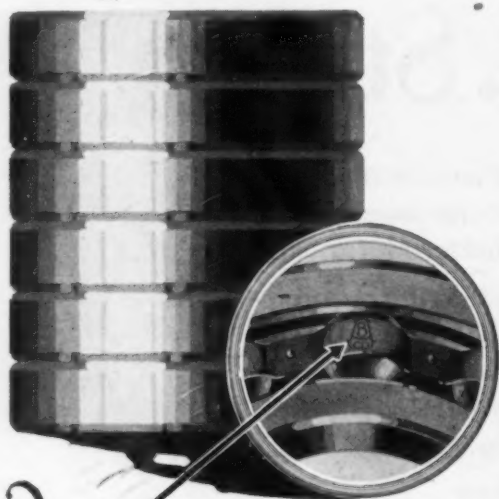
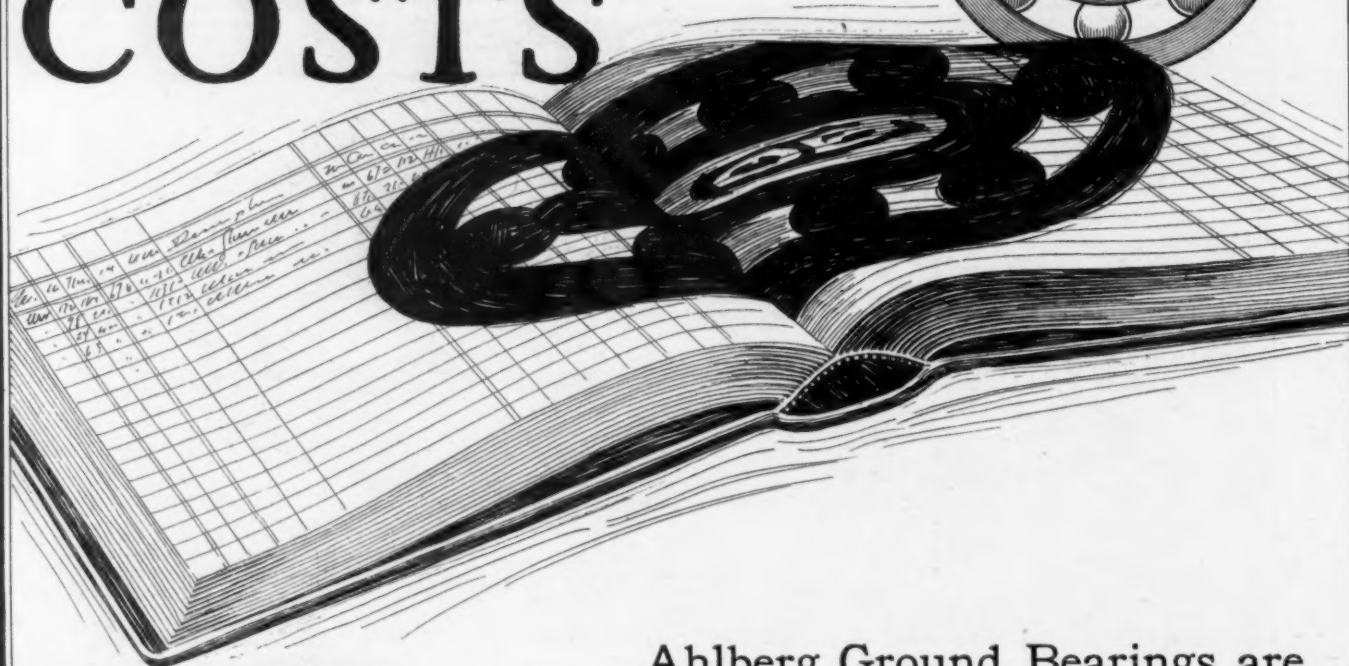
B6 Armory at Chicago Show

H. C. S.

DESIGNED AND BUILT BY HARRY C. STUTZ
H. C. S. Motor Car Co., Indianapolis

FOUR ROADSTER, \$2250 · FOUR BROUGHAM, \$2850 · FOUR COUPE, \$2600

REDUCE REPAIR COSTS



*This mark means
Ahlberg Ground*

Ahlberg Ground Bearings are a most effectual means of reducing repair costs without impairing in any way the quality of the repair work done.

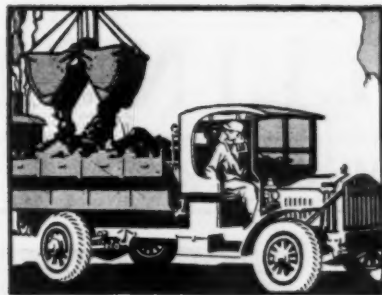
Take your worn Bearings to our nearest branch and see what a great saving you can make by turning them in for Ahlberg Ground Bearings.

ATLANTA BOSTON BUFFALO AKRON THE SIGN BALTIMORE SEATTLE BROOKLYN
CINCINNATI CLEVELAND ST. PAUL COLUMBUS DALLAS DETROIT DENVER
INDIANAPOLIS LOS ANGELES FRESNO DULUTH KANSAS CITY MEMPHIS
MILWAUKEE MINNEAPOLIS OMAHA NEWARK NEW ORLEANS ST. LOUIS
NEW YORK PORTLAND OAKLAND PITTSBURGH WASHINGTON TOLEDO
PROVIDENCE SAN FRANCISCO SERVICE YOUNGSTOWN PHILADELPHIA

AHLBERG BEARING COMPANY
321 EAST TWENTY NINTH STREET, CHICAGO ILLINOIS



Diamond Heavy Service
Pneumatic Truck Tire



Are Pneumatic Truck Tires in Your 1923 Sales Calculations?

There are more than 300,000 trucks and buses on pneumatic tires, according to latest estimates. This does not include small delivery cars. Here, then, is a market that in 1923 will buy at least 1,000,000 tires.

Are you equipped to go after this business in your territory? If not, the newer-in-design and structurally stronger Diamond Pneumatic Heavy Service Truck Tire gives you an unexcelled opportunity to establish a contact with commercial car and bus business. Backed by Diamond's high reputation in the passenger car field and its own obvious superiorities, this pneumatic truck tire requires little sales efforts—sells itself. Write us for details.

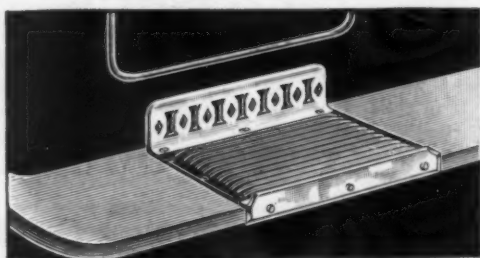
THE DIAMOND RUBBER CO., INC.
Akron, Ohio

Diamond Tires

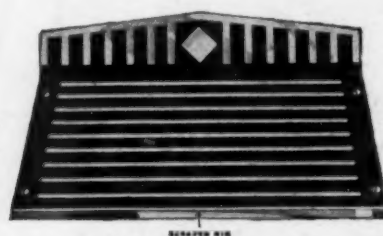
FOR PASSENGER AND COMMERCIAL VEHICLES

ILLINOIS PRODUCTS

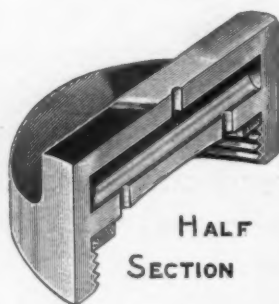
TIME SAVERS - MONEY SAVERS - PROFIT MAKERS



Running Board Toe Plate and Foot Scraper



Aluminum Step Plate



HALF
SECTION

The ILLINOIS Toe Plate is made of highly polished cast aluminum. It protects the body from dents and scratches. Fastens to running board with nickel plated oval wood screws. Foot scraper is fastened on edge of running board. Projecting rib rests on top of running board which prevents buckling.

ILLINOIS Step Plates are made with the ribs running the length of the plate, with first rib extending $\frac{1}{8}$ inch above others and used as a scraper. Made of cast aluminum, back plate highly polished. Furnished in various models and designs.

Illinois No-Wast Aluminum Gasoline Tank Caps

This cap saves gasoline and can be screwed on tight enough to prevent its working loose and getting lost. Note the separate air chamber with three vent holes. Gasoline splashing in the tank against the filler cap enters the two lower holes of the air chamber and drains back the same way. The ordinary filler cap wastes all this gasoline—the No-Wast Cap saves it.

Made for practically all cars—male and female threads. Has handy grip for tightening either with hand or wrench.



Illinois Automatic Windshield Hinge for Motor Trucks

Now used on 90% of all trucks. Made of cold rolled steel and tempered high grade clock spring. Centrally pivoted. Strong, durable, easy working. Three sizes to fit any size windshield.

Illinois Automatic Hinges are also manufactured for factory buildings, stores, offices, hot houses, etc.

ILLINOIS BRASS MANUFACTURING CO.,
224 N. Ada St., Chicago, Ill.



Illinois Ornamental Radiator Caps

Bar caps are made in two types—round and octagon. Made of bronze, highly polished and nickel plated. Guaranteed not to break if accidentally dropped. Drilled with standard hole for Boyce Motometer. Equipped with plug which is removed if Motometer is installed. Furnished for all cars.

We also have a complete line of wing caps.



Our 1923 Catalog Is Ready

This illustrates and describes in detail all the items mentioned here as well as many other items in the Illinois line. Send for a copy.

ATWATER KENT

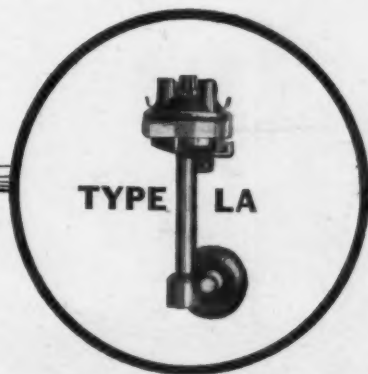
Scientific Ignition

FOR THE
FORD

Atwater Kent Ignition offers many advantages to the Ford owner. It makes a bigger, hotter spark which automatically advances or retards with the speed of the motor. Hand control is also provided. The motor will develop more power with greater fuel economy. Acceleration is much smoother. Elimination of vibration at high speed is decidedly noticeable.

Tell your dealer to show you the

Atwater Kent LA Ignition



ATWATER KENT MANUFACTURING COMPANY
4937 Stenton Avenue, Dept. M. A., Philadelphia

Do Not be "Gypt"

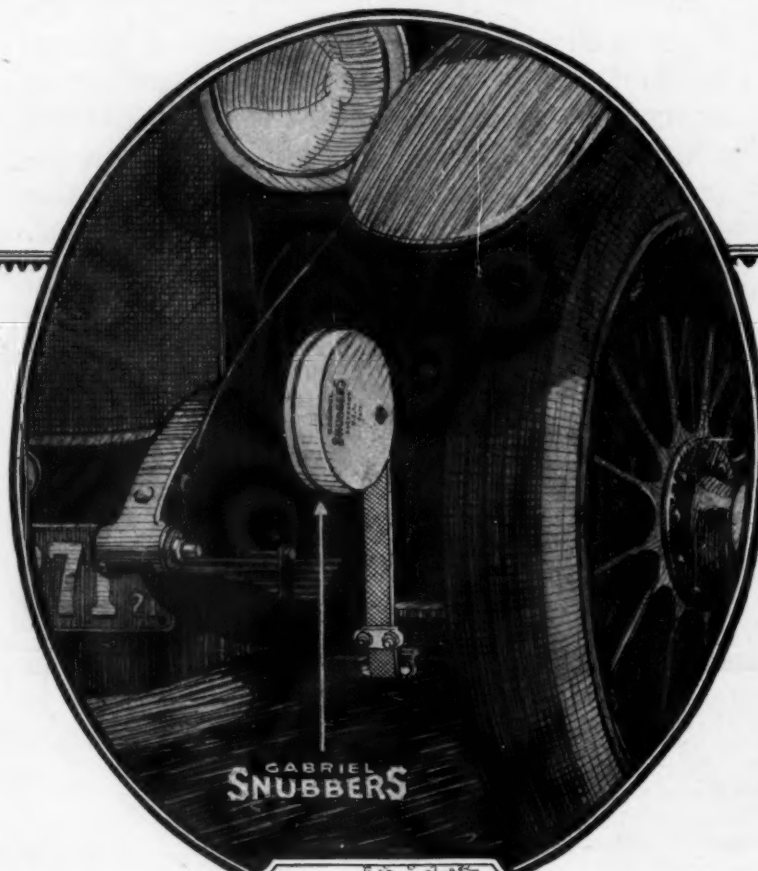
THERE is only *one* Snubber—the "Gabriel". Thirty-seven leading cars are standard-equipped with Gabriel Snubbers. Thirty-four other makes have their frames drilled for them.

Sold by Legitimate Dealers

GABRIEL MANUFACTURING COMPANY
1415 East 40th Street Cleveland, Ohio

GABRIEL
SNUBBERS
THERE IS NO OTHER

Keep You on
the Seat



Save Your
Car

GABRIEL
SNUBBERS



A Fine Motor Made Finer Still

At the Chicago Show—
F2 Coliseum Annex;
Elizabethan Room,
Congress Hotel

Remarkable though the Kissel motor has always been for efficient performance, the engine that drives the new model "Fifty-Five" Custom-Built Six has unusual power, speed and flexibility.

The new Kissel accelerates from 5 to 60 miles an hour in half a minute, but without the customary vibration between these speeds.

At the same time total car weight has been reduced by hundreds of pounds, yet strength has been added; there is new refinement of distinctive Kissel lines—the natural outgrowth of 17 years' experience in the creation of fine cars.

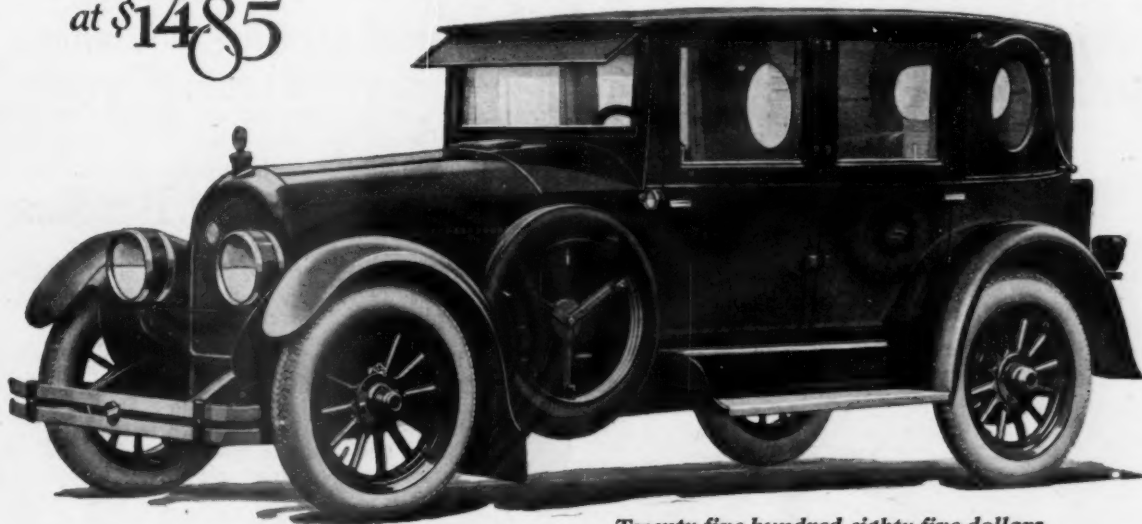
With the announcement of this new line for 1923 Kissel enters into quantity production of the Custom-Built Six, thus making possible substantially lower prices.

Yet every standard of fine craftsmanship has been rigidly maintained, and every exclusive Kissel feature preserved.

In all desirable sales territories now open, there is immediate business in large volume for dealers who offer this line at the new prices. Contracts are now being closed. If you are interested in this exceptional opportunity, write or wire us for further information.

KISSEL MOTOR CAR COMPANY, HARTFORD, WIS.

also a Phaeton
at \$1485



Twenty-five hundred eighty-five dollars
Standard Sedan twenty-two eighty-five

KISSEL

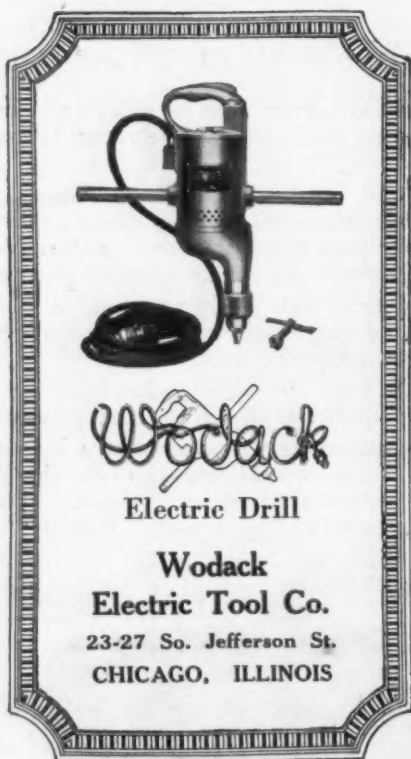
The Custom Built Car





Jacobs
Chucks

Why Profits Disappear



Jacobs Chucks are Standard Equipment on the Best Portable Drills.

Some repairshop owners are still laboring under the delusion that you can put a man in the shop, and say "You're a machine," and he'll be one.

But he'll be what he always was—a human being, with human limitations. He can't drill a hole with his finger. Nor can he grind a piston with his teeth. It takes four of him to lift a motor.

And that's why profits disappear.

Once you start a man running a machine, instead of trying to run him in place of it, you'll begin to profit from his work.

Save Time Relining Brakes



When you start drilling the rivet holes in brake lining, the strip looks as if it stretched from New York to San Francisco. Here, then, is another boon that the portable electric drill has brought. It cuts the drilling time to a fraction—just another instance of the labor and trouble you can save with the help of an electric light socket.

THE JACOBS MFG. COMPANY, HARTFORD, CONN.

This advertisement inserted in the interest of better Service Equipment in general and "the use of Portable Electric Drills in particular"

"Machine Tools Insure Accuracy"





Model G. This is one of the most popular models we have brought out. As shown to the right, a ten-year-old boy can raise the average passenger car to the maximum height in from one to two minutes.



Service Managers

Study these pictures—
Overhauling time positively
Cut $\frac{1}{3}$



Chicago Show

Space 4 and 5

FLAT RATES demand that every repair shop find the quickest possible way of getting work done. With the Martin Auto Hoist you can get work out in from $\frac{1}{3}$ to $\frac{1}{2}$ the usual time. This is being done every day in dozens of busy repair shops.

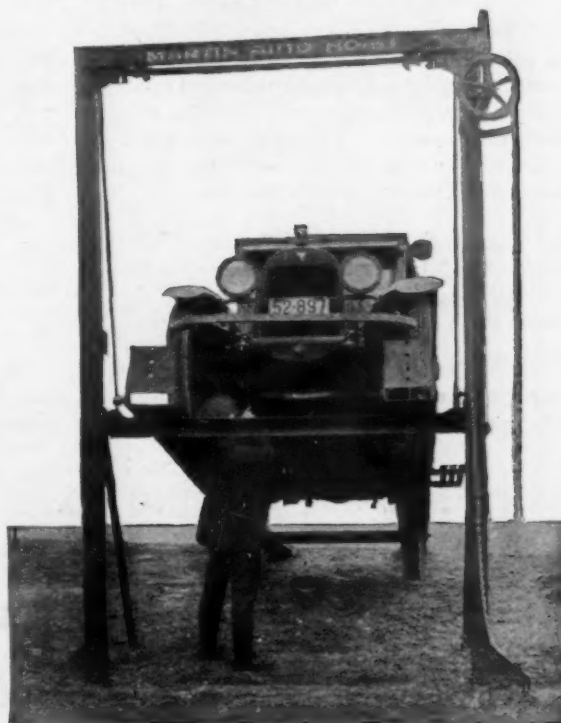
Simply Martin Auto Hoist the car to a position which permits your mechanics to get at it—easily, naturally, not lying on their backs under it, but standing straight up or sitting on a comfortable stool. Away with creepers and fire-hazardous pits. The Martin Auto Hoist is proof that "position is everything."

With the Martin you don't even need to empty the radiator or tank, or remove battery. And it is SAFE, absolutely. No jacks. No lost floor-space with the Martin—when not in use, a car can stand on it. Several models, all covered by broad basic patents. EASY PAYMENTS. Write for special plan which permits you to pay for your Martin out of the PROFITS it earns for you. Remember—it saves big money on every job. Printed matter free.



AUTO-HOISTS

The T. A. MARTIN EQUIPMENT CO., INC. BRIDGEPORT, CONN.



Model "L" particularly suitable for gasoline filling stations. Used in draining crank cases and greasing cars.



Transforms Any Ford!

*Every owner wants it installed
—on sight*

Replacing the 2 plain washers in the Ford rear axle with Bantam Thrust Ball Bearings F-40 makes all the difference in the world. Ten, fifteen, twenty thousand miles without trouble, users report. Besides this, F-40 cuts down friction and gets more power to the rear wheels. Fords climb better, coast faster and farther, use less gasoline.

A "Clemons Special" (Ford) equipped with Bantam F-40 by Mr. F. E. Clemons of Indianapolis, recently did a track mile at Kalamazoo in 48 seconds flat.

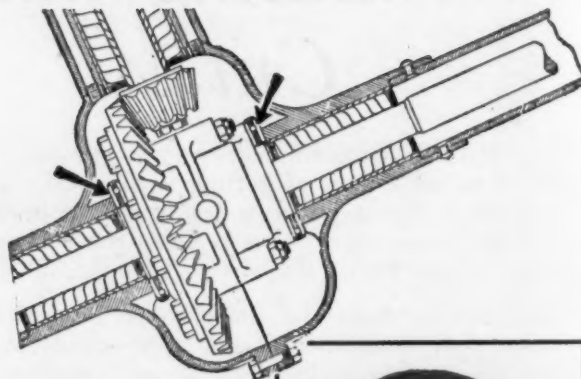
All Ford Cars used to come with thrust ball bearings in the rear axle. Now they have only plain washers. When these washers

wear, the differential shifts away from the driving pinion — until one or both let go.

Bantam F-40 is strictly high class. Heat-treated collars, ground raceways, 40 highest grade steel balls, solid bronze retainer.

No wonder they sell on sight. Show F-40 and you get the "go ahead" to install it. A real winter overhauling opportunity.

Your distributor carries F-40 in stock. If he cannot supply you, write direct to one of the addresses below.



Bantam Replacement Bearings are made in sizes to fit all makes of cars, trucks and tractors. Latest Price List sent direct of us.

BANTAM BALL BEARING CO.,

BANTAM, CONN.

Pioneer Manufacturers

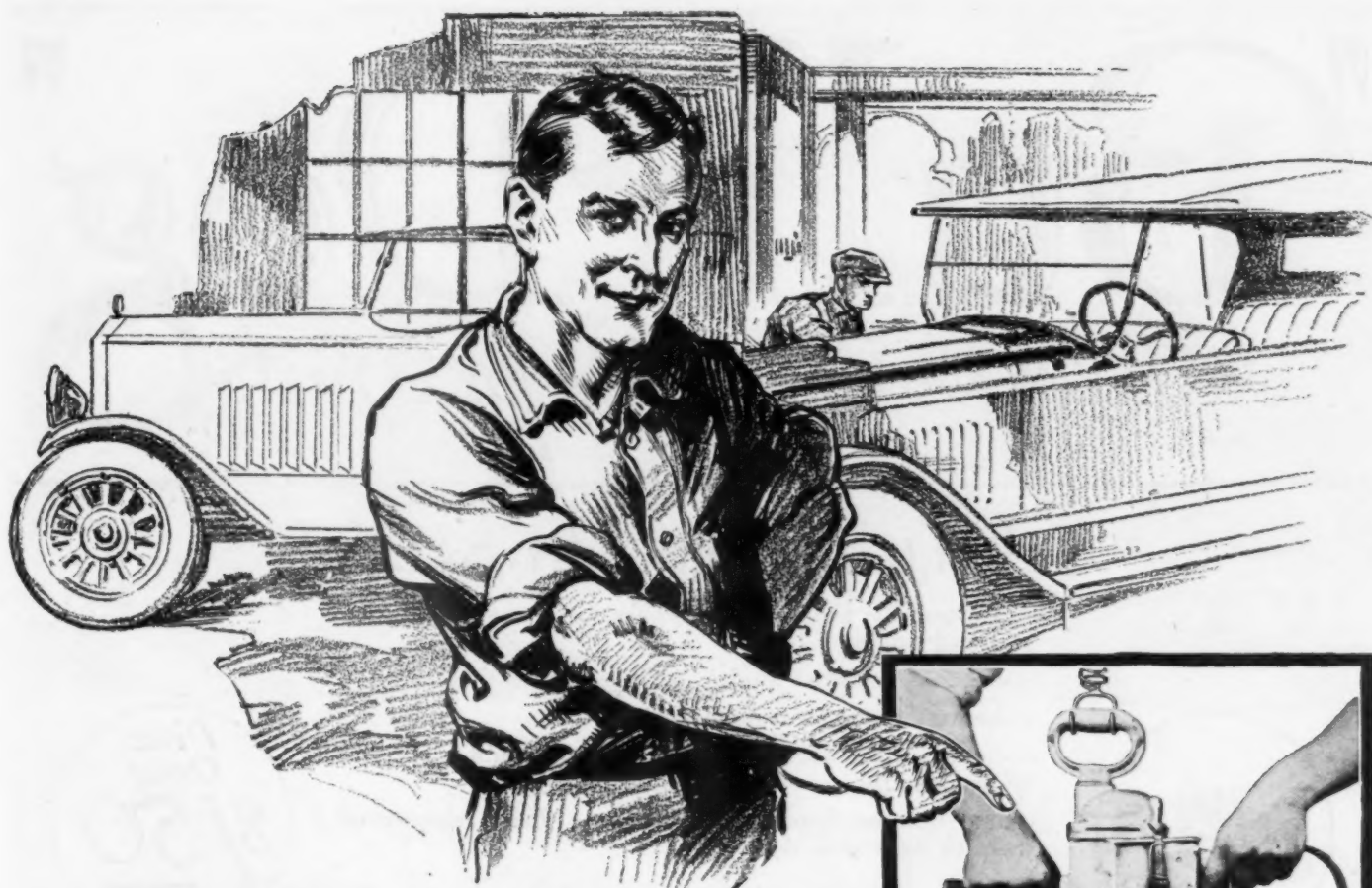
Detroit Office,
905 Dime Bank Bldg.

BANTAM

Ball Bearings

Frank M. Cobbletick Co.,
103 Polk St., San Francisco

Mr. F. M. Boyd, The Avon,
6 East Read St., Baltimore, Md.



Fit New Pistons At a Profit

GOOD service shops no longer merely fit a poorly operating motor with new piston rings, and hope for restored compression and new life. They now fit new pistons—make a greater profit than ever before—and build up a trade of satisfied customers.

When a motor comes in with out-of-round or slightly scored cylinders, they—

Lap It With a RED DEVIL Lapping Machine

This tool has been designed and is used to service the millions of worn cylinder bores, slightly worn, but still too good to require a costly regrinding job.

Sloppy piston fits, causing piston noises and poor compression, cannot be overcome by installing oversize pistons, unless the bore has been lapped with a **RED DEVIL Lapping Machine** to remove irregularities, out-of-roundness and slight scores.

You Can Handle These Jobs In Your Own Shop Without Removing The Engine

Use a Red Devil Lapping Machine with Red Devil Lapping Compound, (which will not injure the finest motor), and show your customers results they have never had before.

WRITE TODAY!

Midwest Manufacturing Company
Minneapolis, Minnesota

Every motor service shop man should have our booklet, "Refinishing Cylinders the 'Red Devil' Way," which tells all about this profitable method of finishing cylinder bores and fitting new pistons. You double your profit on the labor and on the new pistons. Write for your copy today. It's Free.

"Bull Dog"

FOOT ACCELERATOR *for* FORDS

STILL LEADING IN SALES

—because the same model applies to all models of Ford cars and trucks.

—because the same model works on any carburetor.

—because the price is not too high.

—because they work efficiently, without trouble, and give big-car control to a Ford for little money.

—and because Ford owners who use them, recommend them to those who don't.

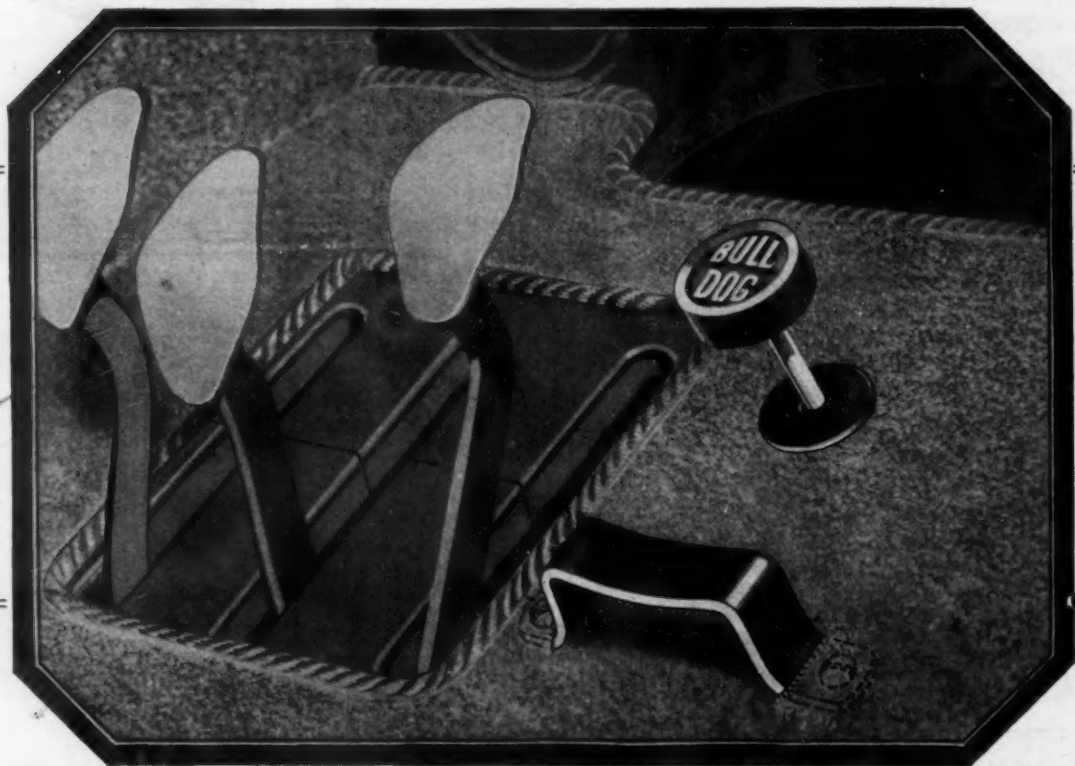
Jobbers everywhere stock them.

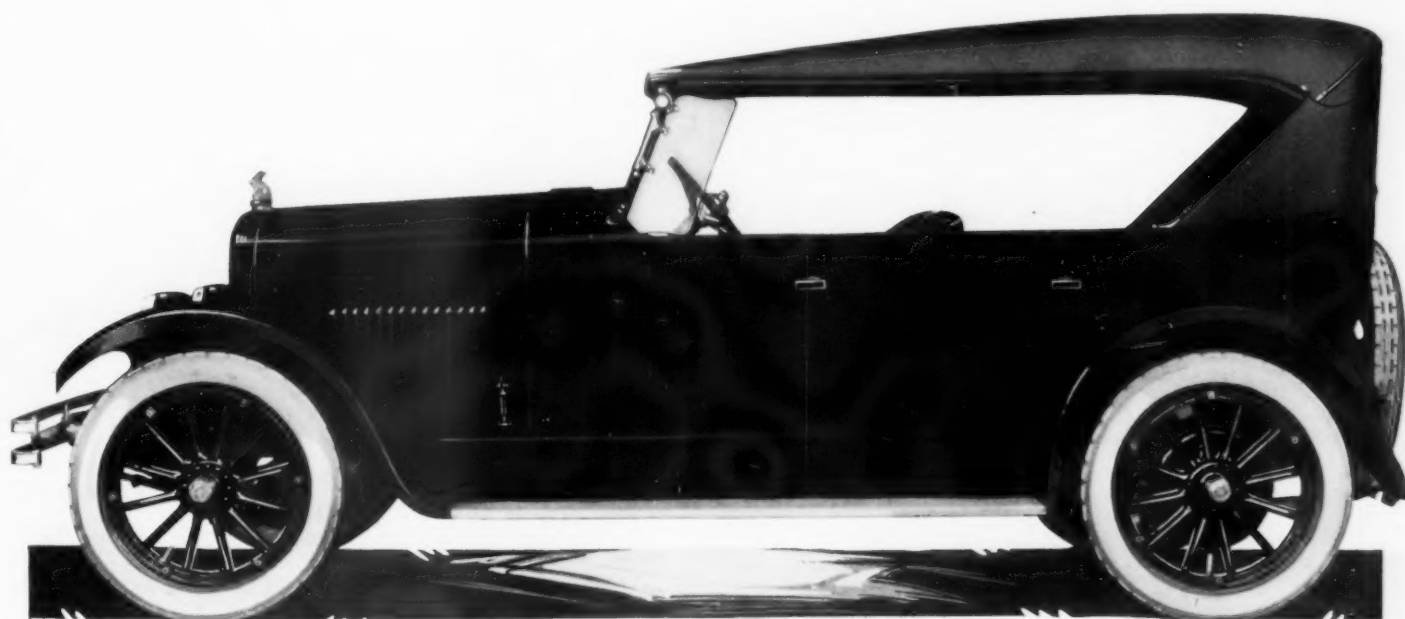
THE W. H. THOMAS MFG. CO.

Spencer, Iowa

Sales Representatives

THE FULTON COMPANY, MILWAUKEE, WIS.





The New Apperson Six—\$1535

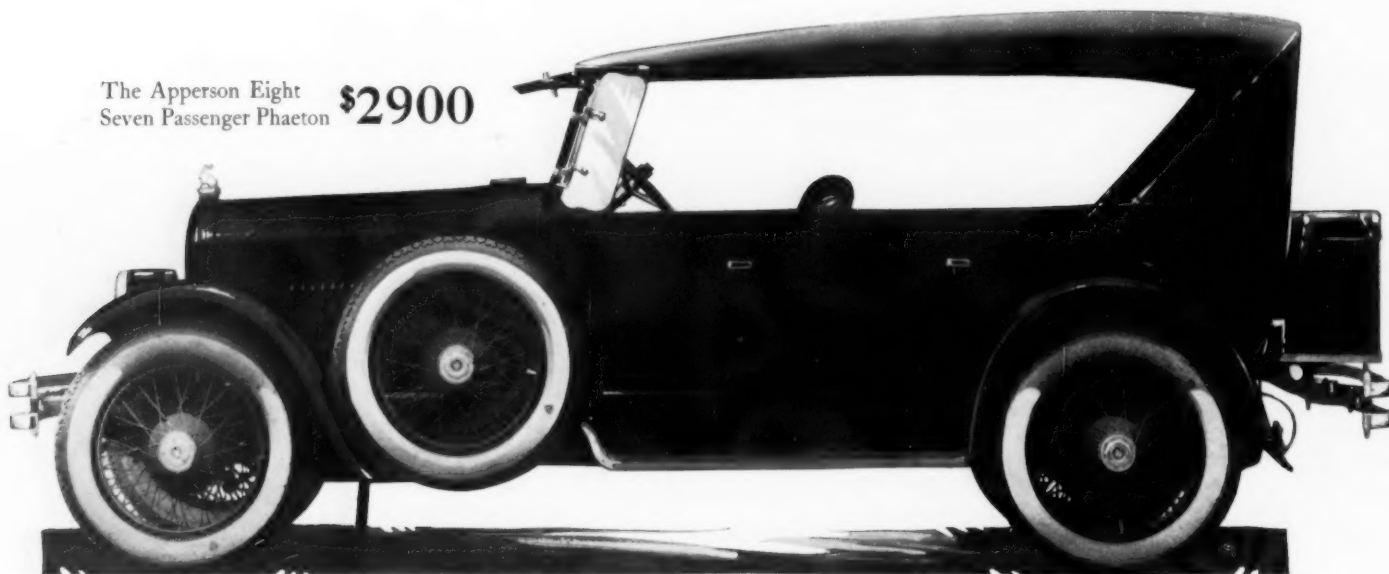
AN unusually roomy five-passenger body mounted on a chassis of 120-inch wheelbase with a powerful, smooth-running, six-cylinder motor; a six-inch frame of the finest pressed steel so constructed as to be practically distortion proof; a car with a driver's compartment that has no gear-shift or emergency brake levers; the first car to adopt the new mechanically controlled leverless gear-shift; and a car that is replete with fine equipment.

The equipment on this new Six at \$1535 includes a permanent top with side curtains stored in back of front seat; double spring type bumper in front; new one-piece windshield; cowl ventilator, side windshield wings; mechanically controlled leverless gear-shift; gasoline gauge on instrument board; outside door handles; push but-

ton on instrument board which operates starting motor; emergency brake that operates on propeller shaft flange by pulling lever located on instrument board; radiometer for registering temperature of motor; seventeen-gallon capacity gasoline tank; cord tires with extra tire mounted in rear; rear-view mirror and automatic windshield cleaner.

In the new Six, Apperson engineers have built a *remarkable car*. It is a remarkable car because it embodies advanced principles of engineering and design found in no other car; because it is capable of doing things on the road, in the mud and on the hills that can not be done by many cars costing three times as much; and, finally, it is a remarkable car because *is is an Apperson—selling for \$1535.*

The Apperson Eight
Seven Passenger Phaeton **\$2900**



The Apperson Eight—Seven Passenger Phaeton—\$2900

THE Apperson Eight makes an irresistible appeal to those who love fine things. At the new price of \$2900 for the seven-passenger phaeton and \$2800 for the five-passenger phaeton it stands out as the finest engineered, most completely equipped car on the market to-day. The wheelbase is 130 inches. The Apperson eight-cylinder engine possesses remarkable simplicity and accessibility. It is a powerful engine that will throttle down to a snail's pace in traffic and then go just as fast as you care to go when you push the accelerator toward the floor board.

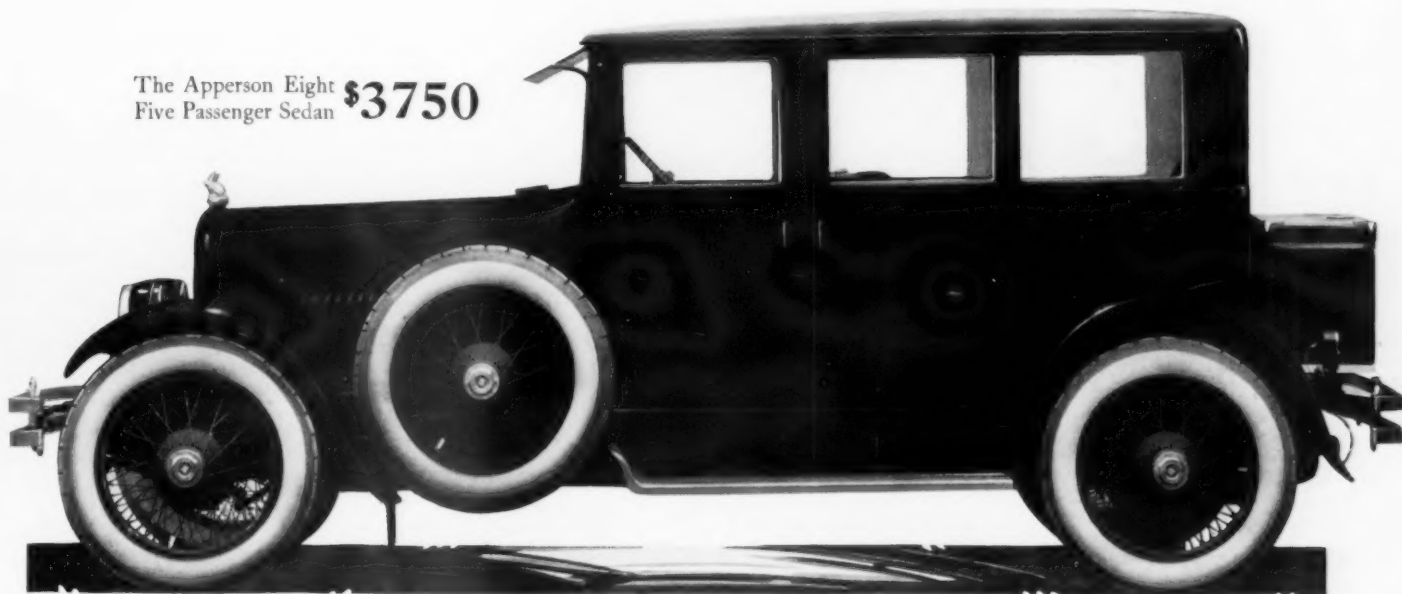
Anticipating every desire of the owner, Apperson designers have equipped these cars with every accessory which will enhance the comfort, convenience and safety of those who drive Apperson cars.

The cowl ventilator affords air circulation to the front compartment; the gasoline gauge is located on the dash; the radiometer for registering the temperature of the motor is located on the instrument board together with the lever which operates the new emergency brake. The two spare wheels with two extra tires are mounted forward; there is a sunshade; rear-view mirror, automatic windshield cleaner, side windshield wings, and trunk rack and body bars. The rain and dust proof trunk on the back is equipped with good, practical suitcases. There is a double type spring bumper in both front and rear, a new, mechanically controlled, leverless gear-shift and a permanent top, which is tailored to each individual car.



The symbol of
fine engineering and
craftsmanship

The Apperson Eight
Five Passenger Sedan **\$3750**



The Apperson Eight—Five Passenger Sedan—\$3750

APPERSON coachwork and body design have for years been the standard by which the fineness and beauty of other quality cars has been measured.

The new five-passenger sedan at \$3750 and the seven-passenger at \$3850 represent the finest cars designed by Apperson Bros. Automobile Company during its thirty years of building strictly quality cars.

The long, strong springs, the deep tailored upholstering of the finest broadcloth, fitted perfectly over seats that are designed to fit the natural riding posture of the body, and the long, 130-inch wheel-base give Apperson a riding comfort which is not to be found in any other car.

The coachwork on these two models represents the work of the custom body builders, the hardware is of the finest quality obtainable, and the detailed appointments emphasize the extent to which Apperson designers have gone to insure every comfort to Apperson owners.

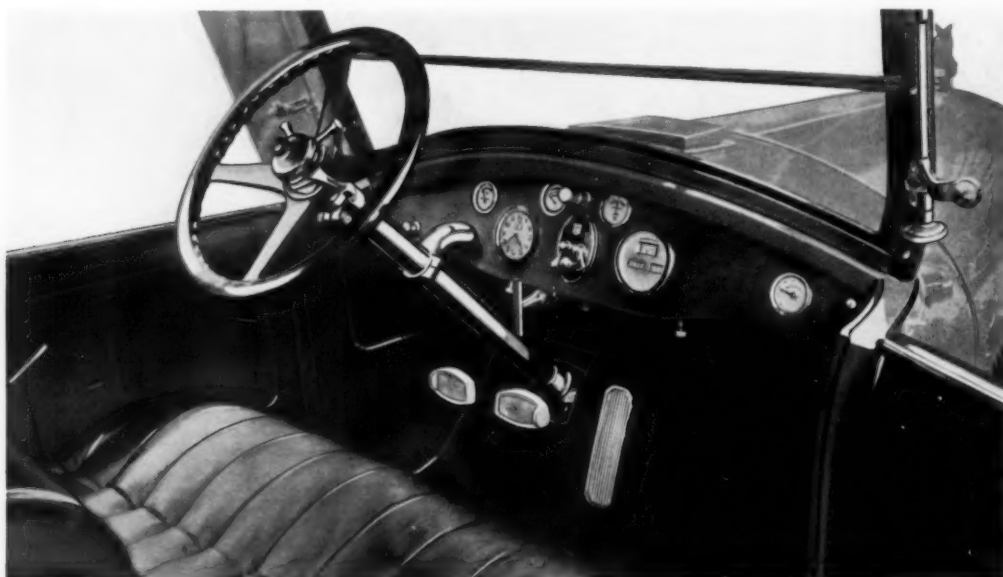
The closed models carry the same long list of equipment as do the open cars with the exception of the side windshield wings. There is a heater in the rear compartment.

The new Apperson Eight is the evolution of thirty years of constant and conscientious engineering—a car that has been refined and improved until to-day it is the worthy successor of the first practical automobile built in America.



The symbol of
fine engineering and
craftsmanship

Driver's
Compartment
of the New
Apperson Eight



The First Car Built Which Has No Levers in the Driver's Compartment

Concurrent with the announcement of the new Apperson Six and the new models of the Apperson Eight is the announcement of the first car built without gear-shift or emergency brake levers in the driver's compartment. To Apperson engineers belongs the credit for the elimination of these two troublesome levers

THIS exclusive Apperson feature is obtained by the adoption of the new, mechanically controlled, leverless gear-shift and an emergency brake that operates from the instrument board.

Apperson is the first car to adopt this new gear-shift—the most revolutionary invention since the introduction of the vacuum feed system.

With this gearshift it is impossible to “clash” the gears. When you want to change gears merely push the lever on the steering wheel quadrant into the speed desired and throw out the clutch—the gears are meshed quietly, smoothly and surely. You don't have to take your hand from the wheel or your eyes from the road. In the illustration above can be seen the lever on the steering wheel, just below the spark and throttle controls, which pre-selects the gears. Note the absence of any levers in the driver's compartment. The mechanically controlled gear-shift is

a convenience, a comfort and a safety factor of such importance that the tendency will be for other high-class cars to follow Apperson precedent.

The new emergency brake is quick acting, positive and very easily operated by pulling the lever located on the instrument board. These two features will be found on both the Apperson Six and the Eight.

The new Apperson line will unquestionably repeat at the Chicago Show the sensational success it had at New York two weeks ago.

We want to make connections with those dealers who are looking for a complete line of cars—backed by a strong factory and a factory policy of sane, aggressive merchandising.

See us at Chicago—Space A-4—or write to the factory direct.

APPERSON BROS. AUTOMOBILE CO.

KOKOMO, IND., U.S.A.



Why Kant-Skore Pistons Have The Patented Spiral Slot

Scientific research and bitter experience have proven conclusively that the ideal piston should be light in weight and close fitting. Kant-Skore pistons successfully combine these two advantages of piston construction. Light-weight is gained by the use of Kant-Skore metal alloy which is one-third lighter than cast-iron. This light-weight, scientifically alloyed metal allows ample wall thickness, as strength of structure need not be sacrificed for light-weight.

It is the patented spiral slot—an exclusive Kant-Skore feature—that enables Kant-Skore pistons to be installed at the closest fit known to the industry today. This self-adjusting spiral split in the skirt of the piston takes care of the heat expansion, giving the piston a uniform clearance under all motor conditions. A spiral shaped slot is used because it has been shown that the spiral slot, by taking care of the entire bearing surface of the piston, absorbs the expansion uniformly, maintaining the perfectly rounded piston.

What the Spiral Slot Means to You

Satisfactory piston jobs, satisfied customers, a growing business with increased profits are all direct results when you install Kant-Skore pistons, with the patented spiral slot, in your piston replacement jobs. The increased power and pep, the decided absence of motor vibration, the decreased consumption of gas and oil, and the quick pick-up of a Kant-Skore equipped motor are advantages that will please your trade and produce results for you.

Fall in line with the hundreds of repair men, regrinders and dealers who are making good with Kant-Skore pistons. Write today for our booklet that will tell you how to go after the replacement trade in your territory.

THE KANT-SKORE PISTON CO., CINCINNATI, OHIO

Factory Branch: 1514 McGee St., Kansas City, Mo.

Kant-Skore

PISTONS

WEIGH LIGHTEST · FIT TIGHTEST

Kant-Skore Piston Advantages:

- 1—Weigh Lightest; Kant-Skore metal weighs about one-third as much as cast-iron.
- 2—Fit tightest; Installed at the closest known fit. Clearance maintained constant at all speeds by Patented Spiral Slot.
- 3—Strong; strength not sacrificed to secure light weight—amply proportioned throughout.
- 4—Cooler Motor at all speeds. Kant-Skore Alloy radiates heat five times faster than cast-iron.
- 5—Less wear and tear on bearings.
- 6—Precision in manufacture. Cast in permanent molds, ground to precision.
- 7—Smoothness and silent flexibility of power.
- 8—Replaces cast-iron pistons with gain of great many advantages.
- 9—Increases speed and power.
- 10—Increased mileage per gallon of gas, reduced oil consumption.

CHICAGO SHOW

JAN. 27TH — FEB. 3RD
Kant-Skore Pistons will be exhibited at Booth No. 96, located in the Coliseum Gallery. We will be pleased to have you make our booth your headquarters while attending the show.

Send the coupon for your copy of this booklet now



THE KANT-SKORE PISTON CO.
How Spring Grove Avenue
Cincinnati, Ohio

Please send me copy of "How to Go After the Piston Replacement Business" Booklet, Price List and full details of the Kant-Skore Proposition. I am a

☐ Dealer ☐ Repair Man ☐ Regrinder

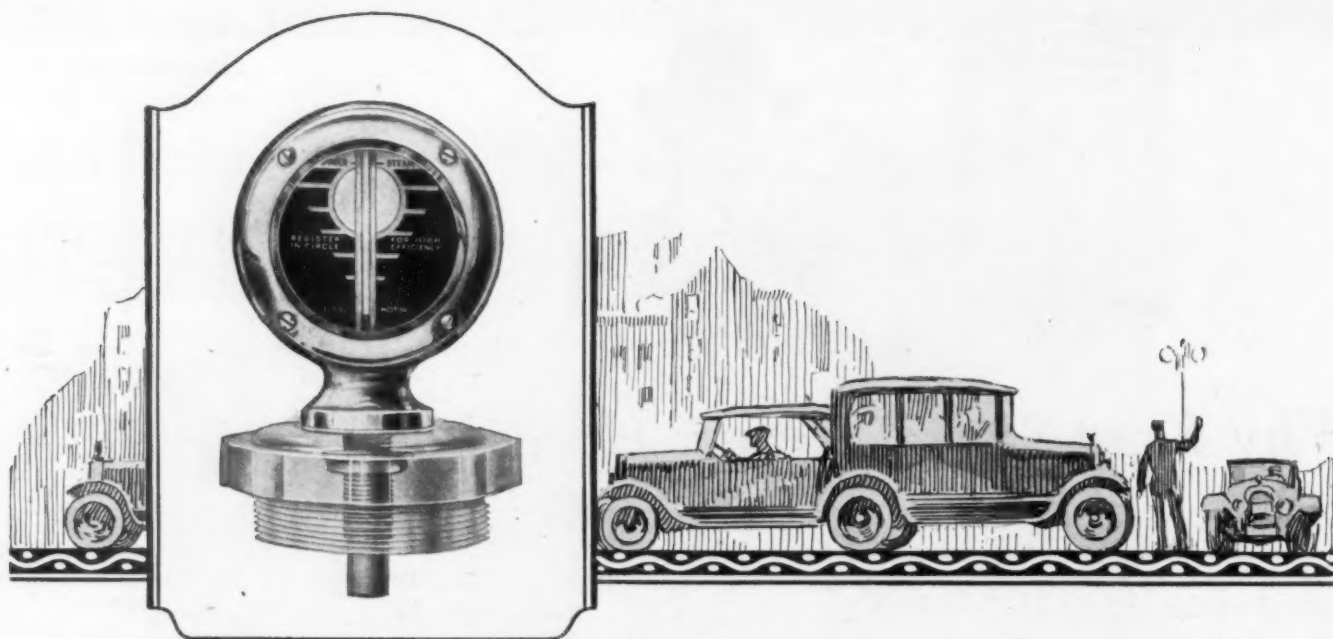
Name _____

Street No. _____

City _____

State _____

MA-1-25-23



Announcing the

NEW MIDGET MODEL

"THE New Midget Model Boyce Moto-Meter will sweep the small car market clean"—this is the opinion of everyone who has seen this latest offering to the motoring public.

The new instrument is merely a small reproduction of the larger models—doing the same work with the same high standard of efficiency.

We wish to call this new instrument particularly to the attention of Boyce Moto-Meter Service Stations, for it is certain that the New Midget Model will bring tremendous increases to the already astonishing results which they have accomplished during the past year.

The list price of this new instrument is \$3.50, which offers an extremely liberal margin of profit.

Do not miss this new opportunity to reach a tremendous market. Write today either to your jobber or to us, and we will send you full facts on the new Midget Model, without obligation.

THE MOTO-METER CO., Inc.
15 Wilbur Avenue L. I. City, N. Y.



To display the BOYCE MOTO-METER SERVICE STATION SIGN is to attract trade, not only on our line but all other nationally known brands of automotive equipment. We earnestly solicit the support of every good dealer in the country to use this means to build more prestige both for himself and for us.

Ask 'Em to Buy

BOYCE MOTO-METER

The Motorists Choice ~ The Accurate Boyce
Your Car Deserves One

Trans- missions

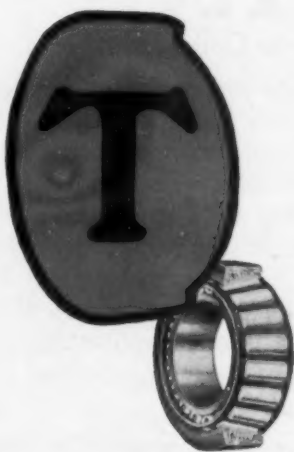
and **TIMKEN** *Tapered* **ROLLER BEARINGS**

To operate quietly and efficiently at high speeds—frequently more than 3,000 r. p. m.—is the basic requirement of transmission bearings.

The unquestioned ability of Timken Tapered Roller Bearings to perform at such speeds is proven by years of successful operation. Such ability furnishes one of the reasons for the ever-increasing installations of Timken Bearings in car, truck, and tractor transmissions.

Here, too, the inherent ability of Timken Bearings to carry all loads in the smallest unit of space is an important factor in the design of the transmission itself.

And Timken adjustability means the simplest possible bearing assembly to insure proper shaft alignment, perfect gear mesh, with consequent permanent quietness of operation.



The Timken Roller Bearing Co
CANTON, OHIO



This is a Textolite Timing gear for Overland cars



See our exhibit at
the Chicago Show
Section C-1,
Basement
Coliseum

Get the Big Noise First then the little noises will be easy to find and stop

Ninety percent of engine noise is in the timing gear train. If metal to metal contacts can be avoided the noise from this source will cease *permanently*. There is one best way to accomplish this—put in the cloth camshaft gear called

Textolite

A product of General Electric Company

This gear is made up of layers of canvas impregnated under pressure with a special compound. This compound, when hardened, holds the layers permanently in compression, since they are welded, as it were, into a single unit. The result is a gear that will outwear cast iron, yet has all the advantages peculiar to non-metallic gearing. It eliminates noise, absorbs vibration and lengthens the life of the whole gear train. It is unaffected by oil, heat or anything else to which it will be subjected in service. Also, textolite gears can be stored indefinitely without suffering from atmospheric conditions or vermin of any kind.

The proper textolite gear can be supplied promptly for practically any make of car using timing gears.

Distributed to the Automobile Trade by

JOHN C. HOOFF & COMPANY

157 W. ILLINOIS ST.

CHICAGO, ILL.

44-511



REG. U. S. PAT. OFF.

MOTORISTS' CONVENIENCES

See Them at the Chicago Show



ARROW GRIP CHAINS

for Pneumatic Tires

Quick Replacement Fasteners

Win instant favor by their ease of attachment, dependability, all-around satisfaction service.

Quick Replacement Fasteners permit cross chain replacements being made on the road with the hands alone, without removing chains from the tires. Cannot become unfastened accidentally.

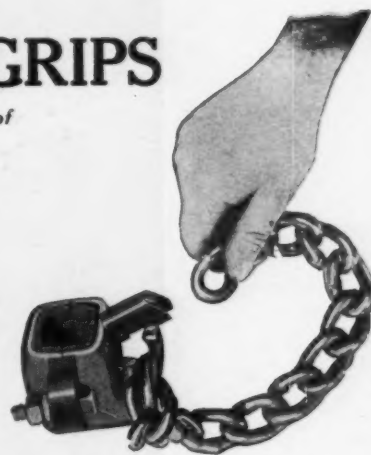
ARROW GRIPS

for all makes of

Solid Tire Vehicles

The Motor's Pal. Assure traction. Keep the truck going regardless of weather or road conditions.

Two parts only, rust proof clamp and chain. The clamp can remain on the spoke permanently; the chain is snapped on in a jiffy when the need arises. Only small piece of chain needed for replacement.



**Stock
the Complete
ARROW
GRIP
Line**

**You and Your
Customer
Will Both Be
Satisfied**



ARROW GRIP JACKS

Handle Controlled

Push under car with the long handle—a few easy turns will raise or lower car. No soiled hands—no grease spotted clothes. Handle folds up conveniently. Entire jack packs in small space. Three sizes. Fits all cars and trucks.

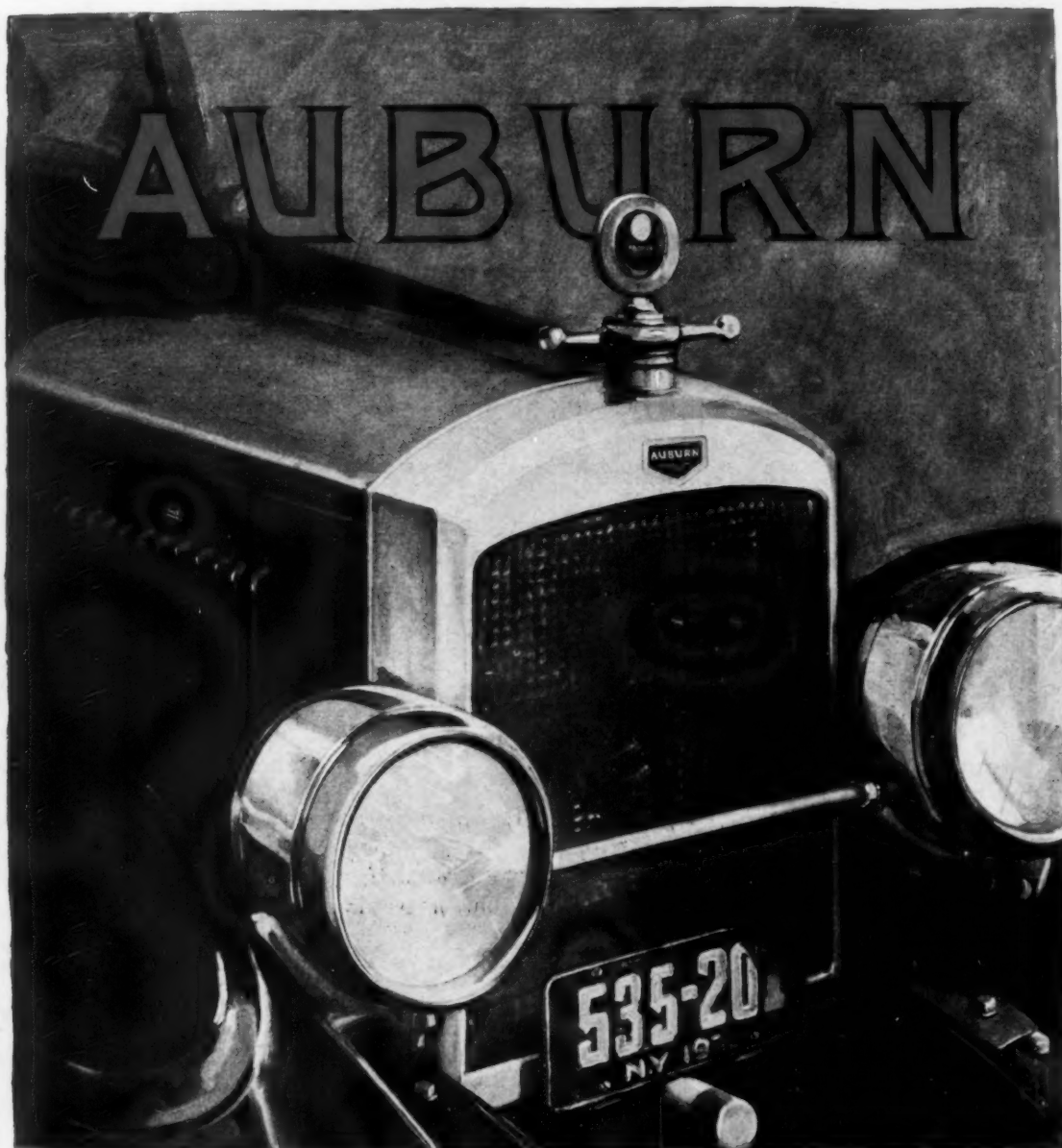
**Quick
Deliveries
Ask
Your
Jobber**

**If He Can't
Supply You,
We'll See You
Get 'Em Quick**

Arrow Grip Manufacturing Co., Inc.

Glens Falls, New York

Export Office: 280 Broadway, New York



The Car that went
Over Big at the
New York Show

AFTER all it is the public that determines which cars shall be most profitable for dealers—and no one who saw the enthusiasm of the crowds about the Auburn display at the New York show can doubt that here is a franchise that means unusual dealer profits for 1923.

Its completeness, now that it includes a smaller Six of all the usual Auburn beauty and distinction, makes the Auburn line available to a great new public which has wanted a car of Auburn quality and reputation, in this compact and economical size. This new Auburn is made in Touring and Touring Sedan types.

Old men in the trade said it was the finest line by far that Auburn had ever shown in the 23 years of its successful history. The new body lines of the Standard Auburn Sixes have added even greater attractiveness and salability to a car that has always been unusual in its appeal.

The Brougham, the Sport, with its many splendid color options, the Sedan and the permanent top Touring car, meet every desire of that great market which wants something more in a motor car than mere transportation. A range of prices and models to meet every demand. \$1095 to \$2245—values unsurpassed.

Auburn is putting behind its product during 1923 a volume of sales producing effort that exceeds anything in its history.

There will be a full year's campaign in full pages in The Saturday Evening Post, liberal cooperation in newspaper advertising, outdoor display and a variety and quality of printed helps that fill every dealer need.

See the Auburn. Estimate for yourself the selling appeal of this splendid and now wonderfully complete line. Ask for the details of the advertising and selling helps, learn about the new liberal non-expiring contract and find out whether your territory is open.

An Auburn franchise means big profits for you in 1923

AUBURN AUTOMOBILE COMPANY

AUBURN, INDIANA



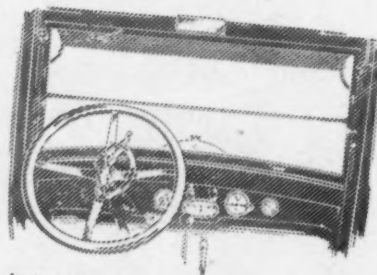


Luxurious In Comfort and Convenience

Closed car comfort and driving convenience are perfectly assured in the luxurious Buick four-passenger six-cylinder coupe.

From the driver's seat, set forward and at a most restful angle, every control is at the finger's tip, while on the instrument board attractive dials record each function of the car. The large walnut steering wheel guides the car at its lightest movement through the improved Buick steering gear, and the long gear shift lever is reached without bending forward.

With a deep, plush upholstered seat for two passengers and a comfortable folding seat for a third, with broad windows that raise and lower to any position, floor heater, dome lights, and other conveniences.



As the driver of a Buick coupe takes the wheel a glance tells him the speed of the car, the fuel in the tank, the working of the electrical system, and the functioning of the engine lubricating system. He has the carburetor control, and lights and ignition at hand. A clock gives him the time of day. Above, a mirror shows the road behind and a wiper and visor safeguard his vision against storms and sun.

Buick Dealers Keep Busy All Winter

Because the Buick Line includes a complete array of both open and closed models—all specially arranged for cold weather driving—Buick dealers sell Buicks all through the winter season. Why not have your name on file?

BUICK MOTOR COMPANY, FLINT, MICHIGAN
Division of General Motors Corporation

Pioneer Builders of
Valve-in-Head Motor Cars

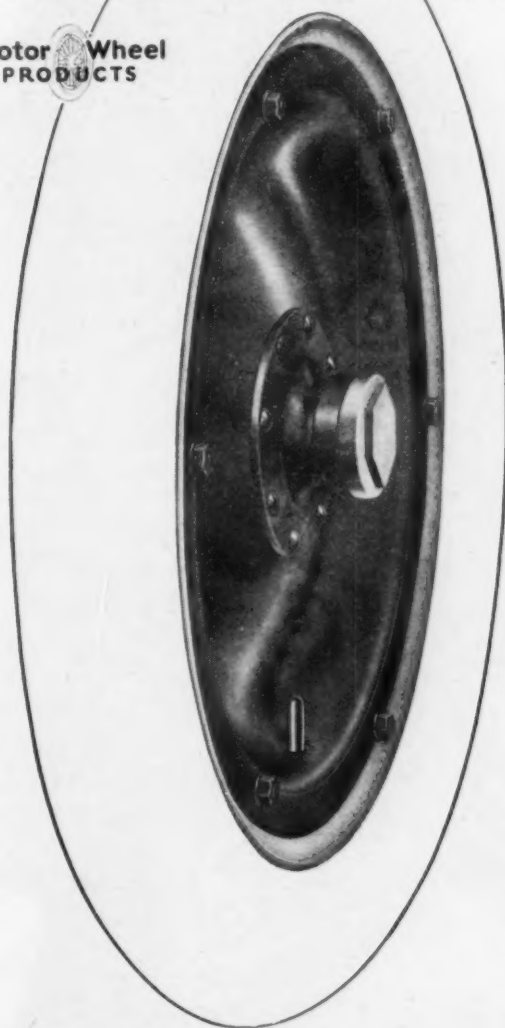


Branches in All
Principal Cities

Tuarc

STEEL WHEELS

Motor Wheel
PRODUCTS



Acceptance

Tuarc Steel Wheels prevail.

Seventeen makes of motor vehicles provide Tuarcs as standard or optional equipment. No less impressive than this number of cars is their character.

That so great a proportion of cars are on Tuarcs, and that Tuarcs have been adopted on such good cars could hardly have been otherwise.

It is Tuarcs which retain the undeniable convenience

of demountable rims on steel wheels; it was the resilient, beautiful two-arc design which made possible the universal outside tire valves on steel wheels.

Other decisive betterments—interchangeable hubs, one-piece disc and felloe, full contact clamping ring—are credited to Tuarcs.

So that there is a very tangible basis for the preference which has made Tuarc the prevailing steel wheel.

MOTOR WHEEL CORPORATION, LANSING, MICHIGAN

Motor Vehicle Wheels Complete—Metal Stampings—Steel Products

Arrow Head

Quality at Quantity Prices

Arrow Head Products are made by expert engineers and mechanics in the largest factory in the world devoted exclusively to the manufacture of Pistons, Piston Pins, Axle and Drive Shafts.

All machinery and equipment is designed for specialization. Consulting engineers have pronounced the plant the best of its kind in the country.



The "Arrow Head" is Your Guarantee

Products

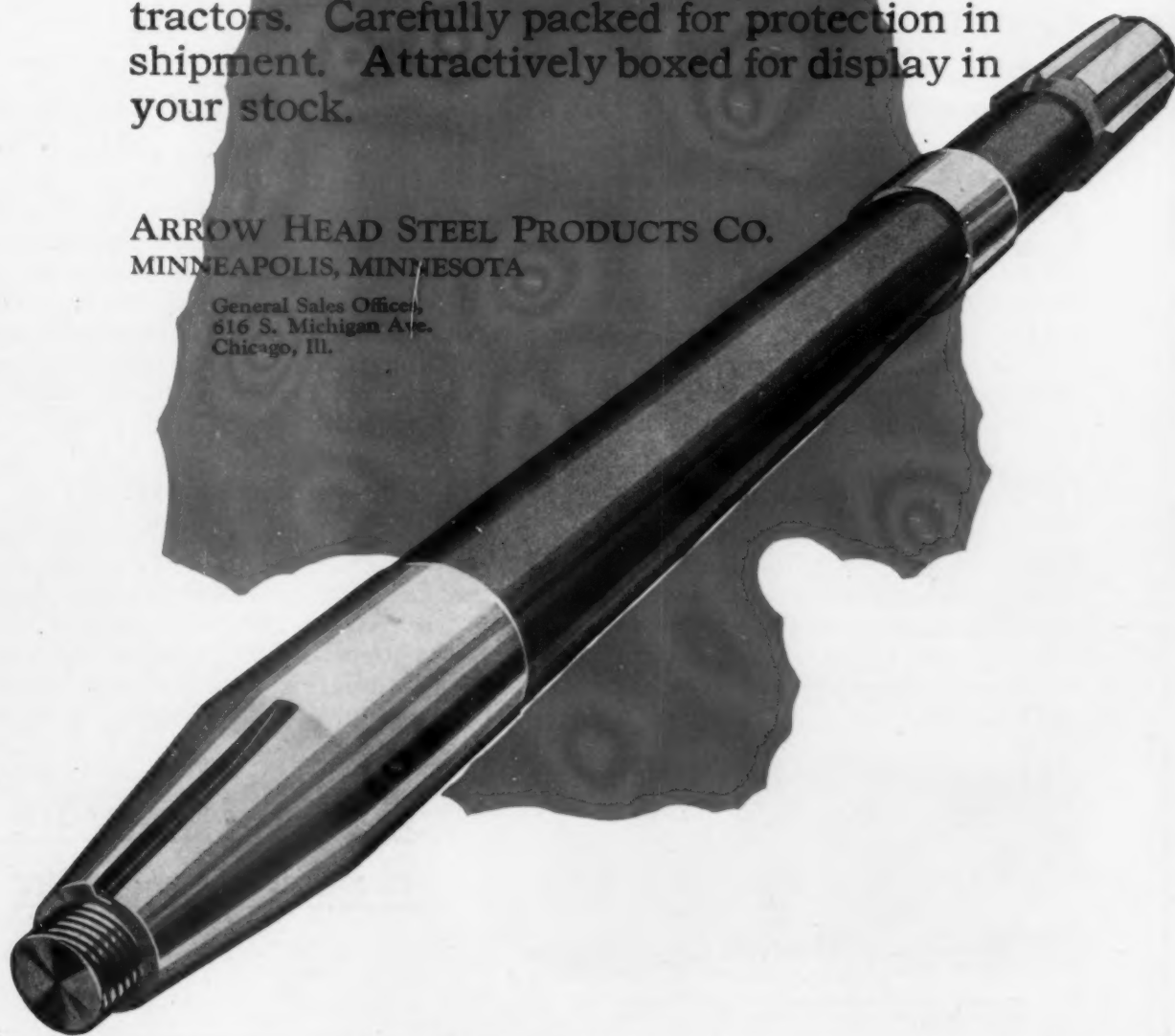
Worthy of Your Recommendation

You can set your "mikes" by Arrow Head measurements. Arrow Head products are tested by the most delicate instruments obtainable.

A complete line for automobiles, trucks and tractors. Carefully packed for protection in shipment. Attractively boxed for display in your stock.

ARROW HEAD STEEL PRODUCTS CO.
MINNEAPOLIS, MINNESOTA

General Sales Offices,
616 S. Michigan Ave.
Chicago, Ill.



Let "Arrow Head" be Your Business Builder

Five Concrete Reasons for INTERNATIONAL Dealer Success

International Motor Truck Dealers are successful. They are developing permanent motor truck business that is producing profitable returns today and which will increase rapidly in the near future. They are aided in their business by five concrete facts which will help the right man build a permanent success in any section where there is hauling to do.

Consider, for a Moment, These Five Points:

1 Complete Line of Quality Trucks

International Motor Trucks are built in fourteen sizes, from the 2000-lb.-capacity Speed Truck to the 10,000-lb., heavy-duty model. The International line includes Speed Sedans, Ambulances, Busses, Funeral Cars, Fire Trucks, Street Flushers, Power Sweepers, Oil Trucks, Dump Trucks, Lumber Units, Log Rollers, Tractor Trucks, and hauling units for every commercial purpose—a line offering the International dealer an unequalled sales opportunity.

2 Liberal Financing Plan

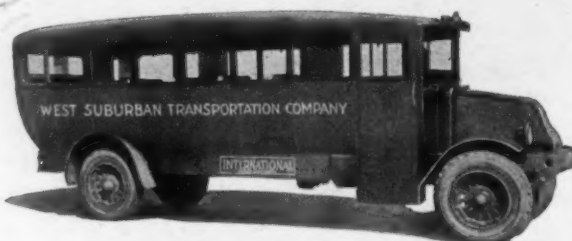
Our financing plan enables International Motor Truck dealers to do a large volume business on a comparatively small investment. It appeals at once to both the dealer and the prospective buyer. Often it is the final inducement which makes the difference between a prospect and a buyer.

3 Sales Promotion Campaign

Our nation-wide advertising in leading magazines and newspapers is creating new business for the International Motor Truck dealer. However, we go further than this—we help each dealer sell his prospects. A direct mail campaign is sent to a selected list of prospects in each territory. Bill posting including the dealer's name completes an advertising campaign unequalled by any other manufacturer.

4 Personal Sales Help

At each of the 93 branch houses of the Harvester Company there is a complete organization consisting of trained motor truck men. These men are always available to help the International dealer close sales. Our organization not only helps locate and develop new business but it directs that business to the dealer.



One of a fleet of large-capacity busses. This model is attracting the attention of bus operators everywhere.

For No. 5 Please See
the Following Page

INTERNATIONAL • MOTOR • TRUCKS

5. Life Insurance for Transportation

Each International Motor Truck carries an Inspection Service Policy which provides free inspection at regular intervals for the life of the truck. This Inspection Service is absolutely free to both dealer and user. Factory-trained road engineers make written reports to the owner and the dealer showing the exact condition of the truck. It is after-sale service like this which saves International owners many thousands of dollars every year and brings repeat business to the established International Motor Truck dealer.

Back of this Service Policy stands a Company with more than 90 years of successful manufacturing experience—a Company operating two large motor truck factories with a third under construction—a Company which is the largest producer of a complete line of motor trucks in the world—a Company that knows what actual hauling economy means in its own business, and one that builds motor trucks for just one purpose, "Low-Cost Hauling."

International built-in stamina, power and dependability plus the five business-builders in our contract mean success for the International dealer.

The International Motor Truck contract may be available in your territory. Wire or write for complete information. Your inquiry will receive prompt attention.

INTERNATIONAL HARVESTER COMPANY
of America
[Incorporated]

Chicago

Motor Truck Department

U S A

The International line includes Speed Sedans, Ambulances, Busses, Fire Trucks, Funeral Cars, Street Flushers, Power Sweepers, Dump Trucks, Oil Trucks, Log Rollers, Tractor Trucks, Lumber Units, and trucks for every commercial purpose.



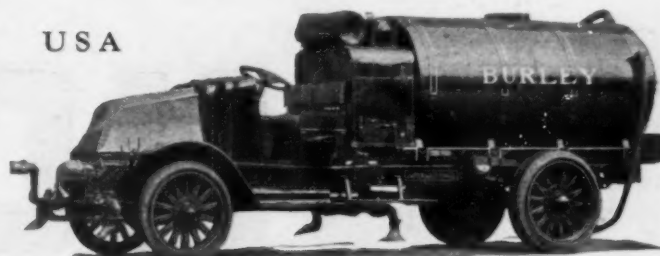
Model S International Speed Truck with open express body and enclosed cab. Three-quarter or semi-enclosed cab can be supplied.



Panel stake body with three-quarter enclosed cab. Enclosed or semi-enclosed cab can be supplied with this type of body.



Open express body with full length top and three-quarter enclosed cab. Enclosed cab and side and rear screens available if desired.



Model 101 International Truck with Street Flusher equipment.

FOR · LOW · COST · HAULING



Concentrate on a *better* motor oil

THE SUNOCO SALES PLAN is based on rendering to automobilists a complete lubrication service instead of merely handling oil. We have outlined this plan in our booklet: "Making More Money out of Motor Oil." Send for a copy today.

A MAN is known as successful when he gets his business out of the common rut; when he delivers a service or sells an article a little *better* than the ordinary. Sunoco Motor Oil, for instance, is an oil apart from ordinary oils—a different and better oil.

It is pure, clean, uniform—*wholly distilled*. It reduces carbon troubles because it is not a compound; *contains no hard-carbon forming ingredients*.

It absorbs water, overcoming scored cylinders, and, in winter, frozen and broken oil pumps and crankcases.

Hundreds of motor oil dealers have become successful by *specializing* on Sunoco Motor Oil. They have reduced their overhead, increased their profits and built up a big repeat business.

Repeat business is the surest way of increasing profits and reducing selling expense; of putting a business on a bigger, better and more profitable basis.

Start concentrating on Sunoco Motor Oil *now*. You will find it greatly to your interest and profit to do so.

SUN OIL COMPANY

PHILADELPHIA

Branches and Agents in
Principal Cities

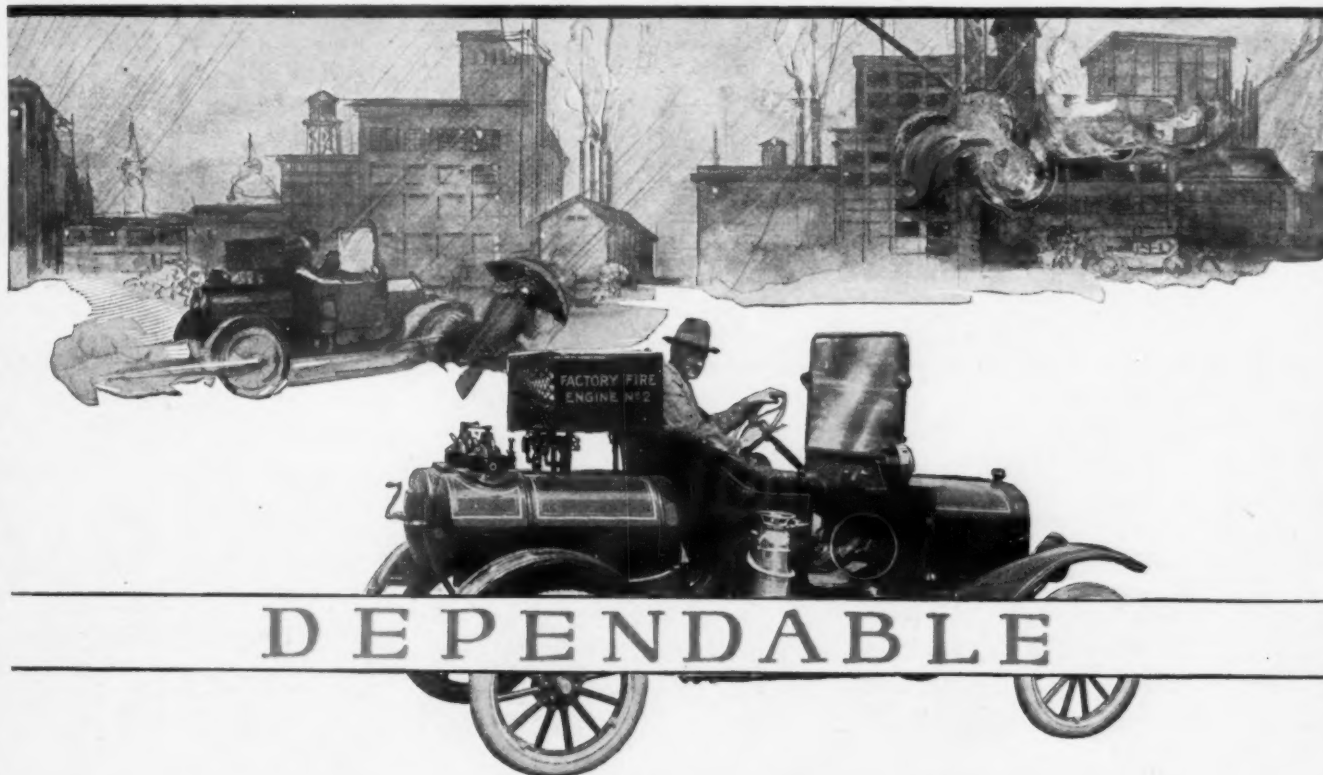
1923
HOW TO LUBRICATE YOUR CAR
SUNOCO
MOTOR OIL
LUBRICATION GUIDE



SUNOCO

MOTOR OIL





DEPENDABLE

FIRE! A rainy winter's morning with wet, slippery roads. A blaze is discovered in a corner of a big manufacturing plant. A hurried alarm is turned in.

The factory Ford fire-truck responds. It comes roaring along the glassy pavement at break-neck speed, the driver gripping the steering wheel with both hands. Yet the truck is under perfect control. It is equipped with a Williams Accelerator.

When dependability is a factor, the Williams Accelerator for Ford Cars is always selected. It has no complicated parts, nothing to get out of order. It can be depended upon always for smooth, positive acceleration. And added to this are the three easy connections which make installation a matter of a few minutes.

DEALERS: Mention these points when you show the Williams Accelerator to your customers. Order through your jobber.

WILLIAMS BROS. AIRCRAFT CORP.

1211 VAN NESS AVENUE

SAN FRANCISCO

PRICE

\$3⁰⁰

AND WORTH
IT

WILLIAMS ACCELERATOR
for FORD CARS

Oakland Dealers will sell *Mileage* in 1923

Have you heard about Oakland's new
"Mileage-Basis" plan?

Do you know that Oakland—a permanent
division of General Motors Corporation—is
assuring buyers of Oakland 1923 models
of *certain definite* actual mileage from
the cars they buy?

That it promises 15,000 miles or more of
service before valves require grinding—
40,000 miles before crankshaft and con-
necting rod bearings need attention—and
that it continues its special, written 15,000
mile performance guarantee?

Why not sell a car in 1923 that backs its
claims of quality with definite mileage fig-
ures? Oakland dealers will sell mileage in
1923—and selling mileage, they'll sell auto-
mobiles as they've never sold them before.

The 1923 Oaklands

Roadster	\$ 975
Touring	995
Sport Roadster . . .	1145
Sport Touring . . .	1165
Coupe, 2-Pass. . . .	1185
Coupe, 5-Pass. . . .	1445
Sedan, 5-Pass. . . .	1545

F. O. B. Pontiac, Mich.



Oakland "6"

Oakland Motor Car Co., Pontiac, Mich.
Division of General Motors Corporation



Uniform



EVERY Empire bolt, nut and rivet is perfect in material, in dimension and in finish.

The numerous different lines made by Russell, Burdsall & Ward possess alike an absolute uniformity of quality and accuracy.

RUSSELL, BURDSALL & WARD
BOLT & NUT COMPANY

PORT CHESTER, N.Y.

WEMBEK, CONN. • CHICAGO • SAN FRANCISCO • ROCK FALLS, ILL.

Makers of Bolts, Nuts and Rivets Since 1847

EMPIRE BOLTS

WILLYS~

Vibrant Enthusiasm!

No other term can properly express the reception of the eleven beautiful new Willys-Overland models throughout the country during the week of the National Automobile Show in New York.

Local Openings held by Branches and Distributors in all parts of the country reflected such spontaneous public approval of the entire line—especially of the New Creation, the Willys-Knight Coupe-Sedan, the "Big Hit of the Show"—that the week has been properly termed a real Willys-Overland triumph!

Wires received from all points indicate a public approval seldom, if ever, accorded to any other automobiles in the past. In Toledo, the home of Willys-Overland, retail sales totalled 99 cars on Opening Day, followed by 32 retail sales the next day. Sales and enthusiastic crowds reported from hundreds of other cities emphasized an instantaneous public recognition of the outstanding Willys-Overland values.

* * *

Some very desirable territories are open for merchants of good reputation to handle the Willys-Overland line. For men seeking to enter a permanent business where steady development and increasing profits are made surer through a factory policy of 100% cooperation, this is an opportunity worthy of instant attention. Write for confidential information.

WILLYS-OVERLAND, Inc. Toledo, Ohio

Willys-Overland, Ltd., Toronto, Can.

OVERLAND

Overland
TRADE MARK REG.

Circulate — don't Hibernate

WINTER stay-at-homes who never dreamed it possible to enjoy so much comfort, at such low cost are finding freedom through the extraordinary economy of this beautiful New Overland Sedan.

Scientific ventilating and roomy seating make this the ideal practical family car for all year. Many refinements and improvements now are added to those qualities which have caused nearly a

million people to buy Overland Cars. The greater Overland value includes Triplex Springs (Pilevins) which create unequalled riding comfort and retain the economy of light weight, and sturdy axles with standard Timken bearings which insure durability under hard usage. Tires are oversize. Operating cost is low.

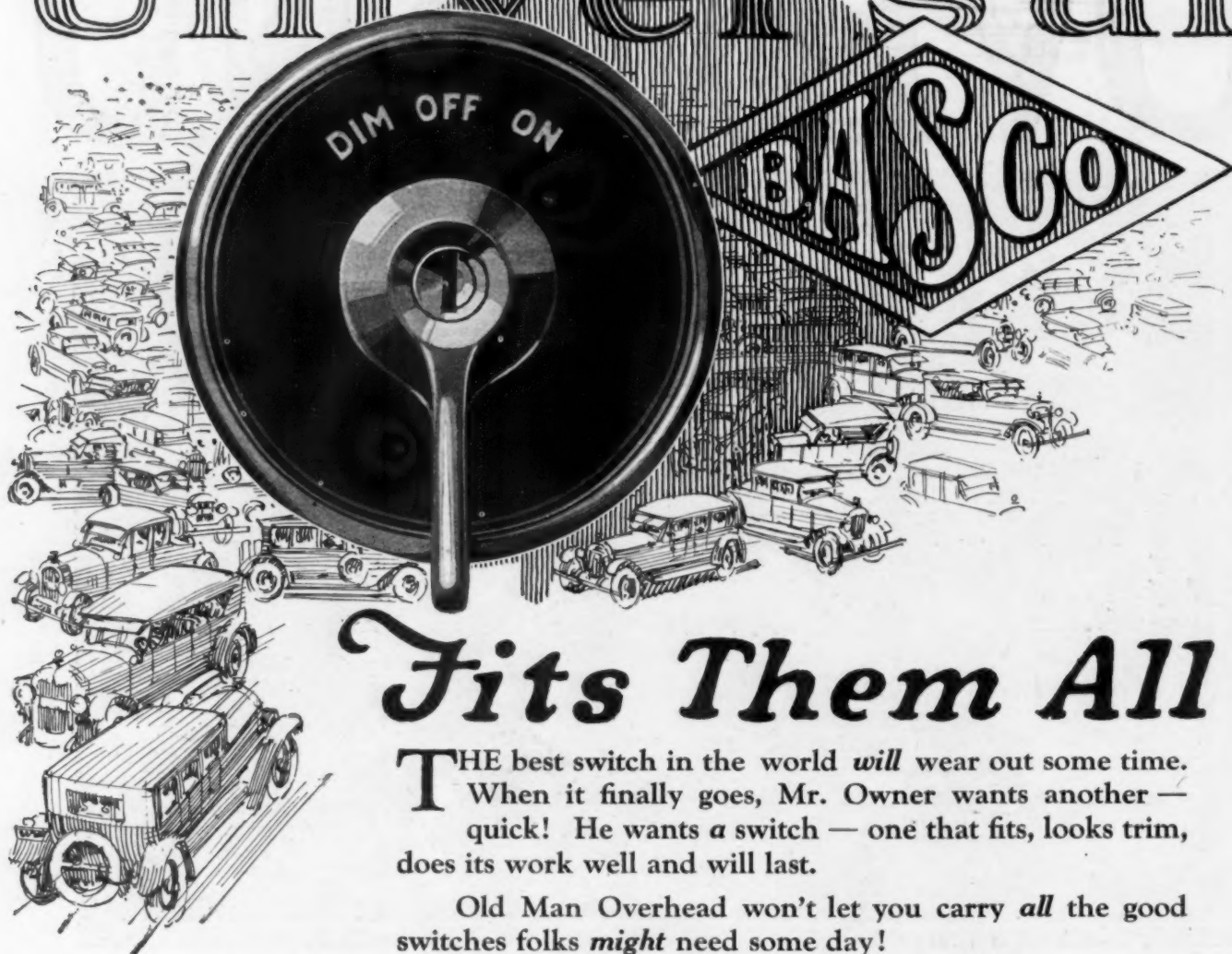
Write for interesting Overland book. Willys-Overland, Inc., Toledo, O. Canadian Factory, Toronto.

"Drive an Overland and realize the difference"

OVERLAND, INC. TOLEDO, OHIO
The Willys-Overland Motor Corporation is a subsidiary of the
WILLYS-CHRYSLER CORPORATION, CHRYSLER BUILDING, NEW YORK, N. Y.

The above advertisement
appears January 20th
in the center spread
of the Saturday
Evening Post and
other Publications

Universal



Fits Them All

THE best switch in the world *will* wear out some time. When it finally goes, Mr. Owner wants another — quick! He wants a switch — one that fits, looks trim, does its work well and will last.

Old Man Overhead won't let you carry *all* the good switches folks *might* need some day!

Stock the Basco Universal — the switch that's a whole stock in itself!

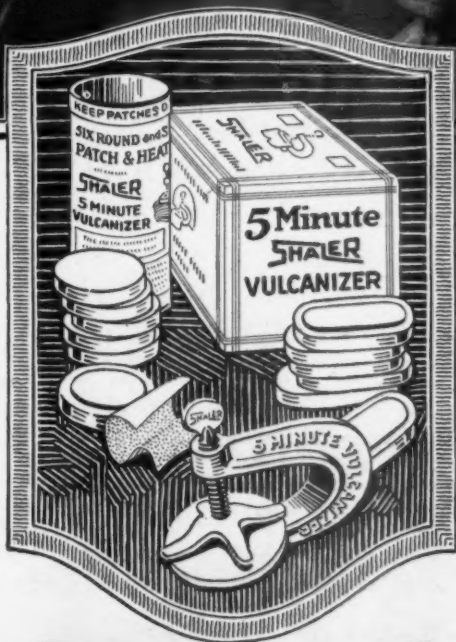
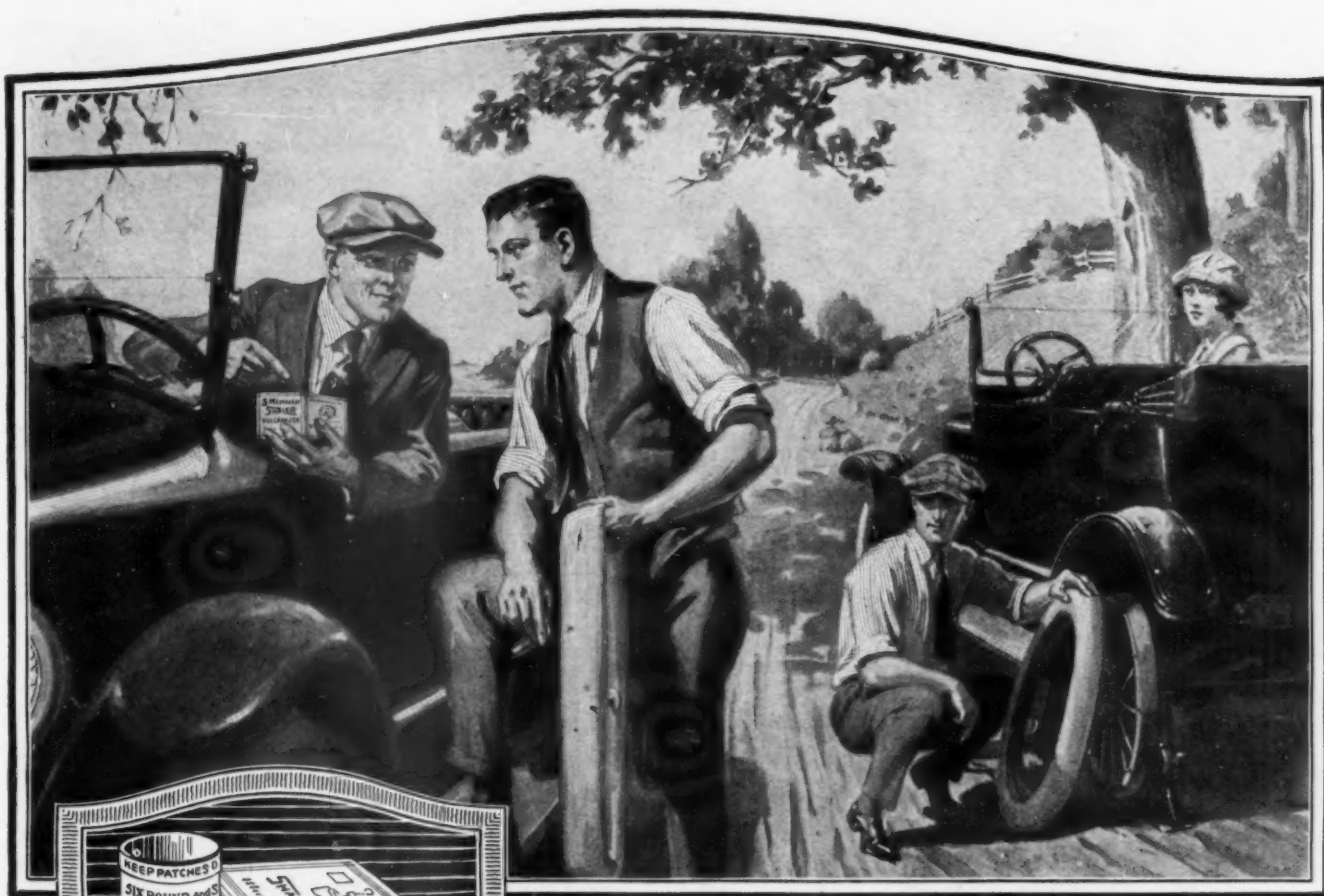
Interchangeable with switches on practically all makes of cars. The *ideal* renewal switch, *designed* to take care of *any* system — single or double wired; battery or magneto; two-bulb, resistance or series parallel dimming; metal or wood dash; 6 or 12 volts! And it fits them all correctly—efficiently.

The Basco Universal (No. 2051) comes with two keys, a 6-volt dimming coil (12-volt if specified), and extra connectors so that the switch can readily be adapted to battery or magneto-equipped cars.

Makers also of Generator Cut-outs; Current Regulators; Motor Driven Horns, Locking Door Handles for Ford Closed Cars, etc.

Write for Latest Catalog of Basco Automotive and Electrical Components.

Briggs & Stratton Co.
 Milwaukee  Wisconsin



SHALER

5 MINUTE VULCANIZER

Send For Window Display Material and Sales Helps

We will supply dealers with attractive window display cutouts and posters, attractive counter display cutouts and circulars, free on request.

A Friend in Need

OVER a million motorists carry the simple Shaler Vulcanizer for emergency use in making quick, permanent tube repairs—at home or on the road.

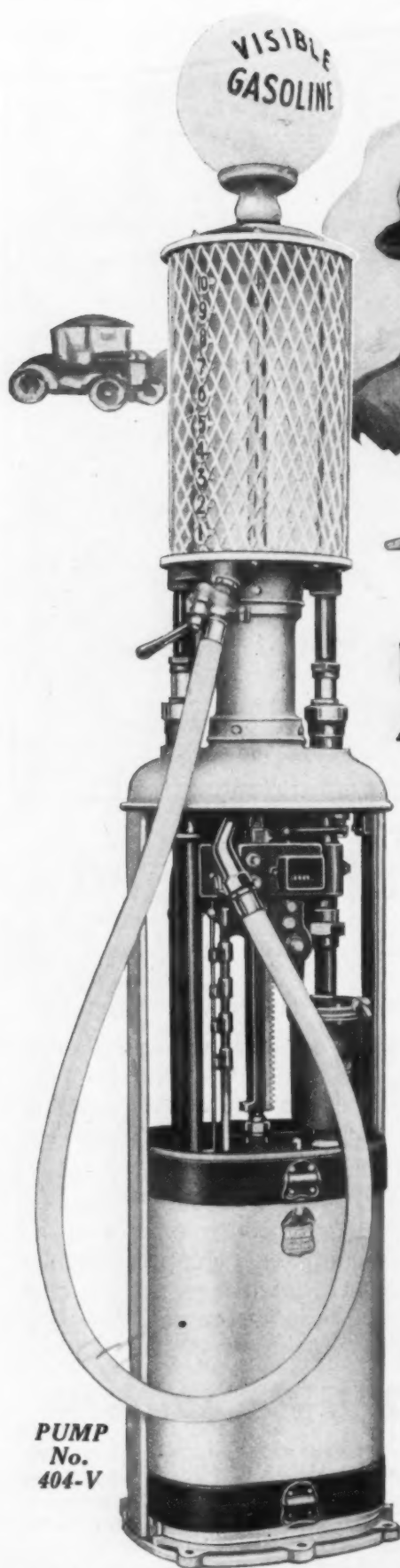
It's easier than sticking on a temporary cold patch, because the Shaler 5-Minute Vulcanizer makes permanent, heat vulcanized repairs that will not come off—stronger than the tube itself. No cement—no gasoline—no flame. Simple, sure, safe, satisfactory.

Quicker than changing tubes. It's so simple that anyone can make perfect repairs. Just touch a match to the solid chemical fuel. In five minutes the cut or puncture is repaired—a heat vulcanized, permanent repair that will not come off, better than any temporary "stuck on" patch—stronger than the tube itself.

The SHALER is Easy to Sell

Practically every demonstration means a sale—a satisfied customer who must come back to buy extra Patch & Heat Units for use with his **Shaler Vulcanizer**. Every sale is but the first of a chain of sales on which you make a liberal profit. No tool-kit is complete without the **Shaler 5-Minute Vulcanizer**. It is the greatest convenience ever offered to tourists or anyone obliged to make repairs on the road.

C. A. SHALER COMPANY, 207 Fourth Street, Waupun, Wis.



PUMP
No.
404-V

CONTAINERS

Either five or ten gallon visible containers for other makes of pumps furnished complete with full instructions for attaching.

—"AND HERE'S A 10 GALLON AMERICAN VISIBLE"—

More than ever before, the motorist buys his gasoline in ten gallon quantities. And it's MIGHTY EASY to SELL him TEN gallons when he asks for five.

This American Visible Pump makes both the sale and the serving of ten gallons a WHOLE LOT EASIER AND QUICKER.

American Visible Curb Pump

The 10 gallon pump has all of those desirable features and superior qualities that have made the American Visible the leader among visible pumps. Its action is positive and quick—it is hand operated, absolutely safe—no danger from breakage, fire or explosion. All the gasoline is filtered, and an accurate meter, furnished without extra charge, registers all gasoline pumped into container.

Write us for full information and our VERY REASONABLE prices.

The American Oil Pump and Tank Company

1159 FINDLAY STREET,

CINCINNATI, OHIO

THE WORLD'S STANDARD REPLACEMENT TIMING GEAR



FEW motorists realize that worn timing gears are responsible for "that humming, howling, rattling or grinding noise." Perfection Silent Timing Gears have become "The World's Standard Replacement Timing Gear" because they silence "that noise." They can never run noisily because they are made of a non-metallic material that embraces quietness, yet possesses the durability of metal—machined with precision accuracy.

Let us send you the name of your
nearest Perfection Jobber



PERFECTION
Silent Timing
GEARS

PERFECTION GEAR COMPANY, 1475 MICHIGAN AVENUE . . CHICAGO

STUTZ SIX

Touring Car	. . .	\$1995
Roadster	. . .	1995
Sedan	. . .	2550

STUTZ *Speedway* FOUR

Roadster	. . .	\$2450
Touring Car	. . .	2640
Bearcat	. . .	2765
Sportster	. . .	2790
Bulldog	. . .	3115
Coupe	. . .	3490

Prices f. o. b. Indianapolis—Tax Extra



The Sign of the Genuine

Overshadowing Price Appeal



If prices are a determining factor in the conduct of the automobile business, the Stutz Motor Car Company of America, Inc., with its new Stutz Six and famous Speedway Four models, takes a commanding place.

Never have automobile merchants been given a better opportunity to sell cars of recognized distinction and exclusive appeal at prices that so completely dispel competition.

The Stutz Six at its phenomenal prices is the acknowledged leader in the field of quality sixes. From the standpoint of appearance, performance, and prestige, it is to be compared only with cars selling for many hundreds of dollars more. Both open and enclosed models set new standards of value.

The Stutz Speedway Four—long since acclaimed America's pre-eminent sport

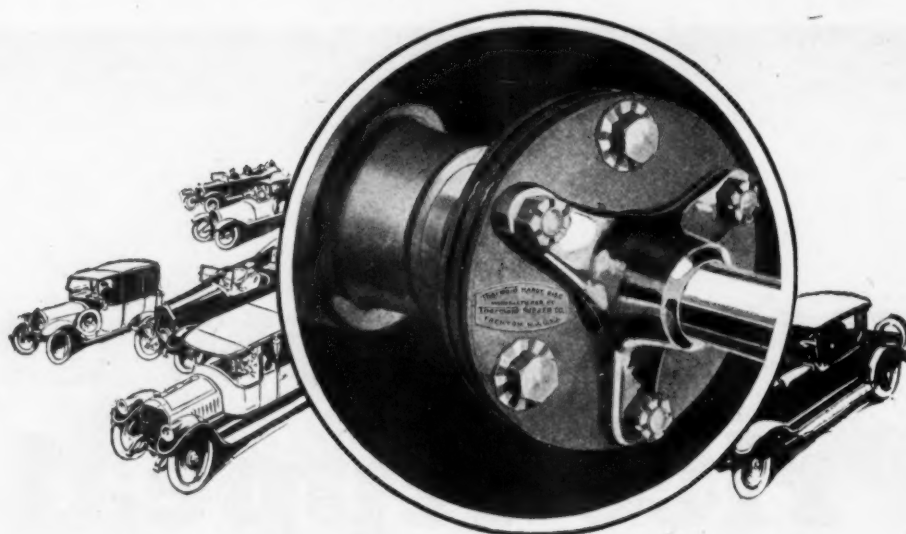
car—now is offered at prices that emphasize more than ever its exceeding value. From its very nature, it anticipates the desires of a certain class of select motorists which no other car so completely fulfills.

Combine these striking merchandising advantages of the new and enlarged Stutz line of popularly-priced Sixes and exclusive Speedway Fours with the superior financial and industrial strength of the parent company, and the new and advanced selling franchise for distributors and dealers and the overshadowing appeal of the Stutz line as a *business-getter* and *profit-maker* for the immediate present as well as the future is at once apparent.

Consequently, the Stutz franchise is in active demand by leading merchants everywhere. We are assigning new territory daily. Write or wire for particulars.

STUTZ

STUTZ MOTOR CAR COMPANY of AMERICA, Inc.
Indianapolis, Indiana, U. S. A.



3,000,000 of them in use today

Why 75 manufacturers have adopted a disc of Fanwise Construction

One-third of the makes of cars on the market today are equipped with the flexible fabric Thermoid-Hardy type of universal joint. In the country as a whole today there are more than 3,000,000 Thermoid-Hardy discs in daily use.

The fabric disc universal joint is established. Cushioning every shock of the road, transmitting a smooth, even flow of power at all times, yet without need for lubrication or attention, the disc universal has been fast replacing metal universals.

The original patent on the disc universal is the patent on Fanwise Construction. Look at the illustration in the square below.

Notice how the disc is built up with the strands of each layer of fabric running in a different direction. Each sector is of uniform strength and elasticity. Every stress is balanced—

- the torsional stresses between the bolt holes
- the centrifugal stresses from the center outward
- the lateral stresses from the forward and back motion of the shaft.

This means the elimination of "whip-

ping" and vibration. It means that the shaft is held in true on every revolution.

Fast replacing metal universals

So flexible that it cushions every shock of the road—yet strong enough to withstand a 21,000 pound twist! Capable of going 60,000 miles without adjustment, lubrication, or attention of any kind—yet built to stand the hardest service on the heaviest trucks.

The Thermoid-Hardy disc type of universal joint marks another forward step in automobile construction.

You should have this book—sent free to any engineer or dealer

We have prepared a book, "Universal Joints—Their Use and Misuse," that treats the whole subject from all its angles—the mechanical principles involved, construction, lubrication, processes of manufacture, tests for strength, and records of performance. Send for your copy today.

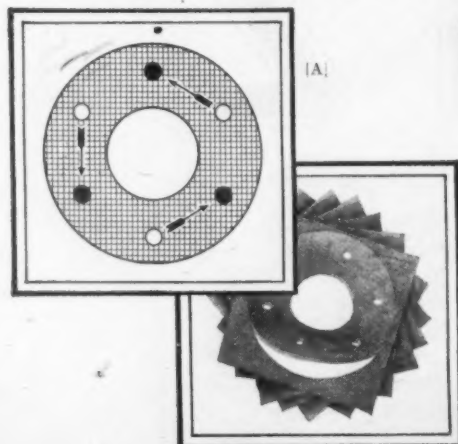
THERMOID RUBBER COMPANY *Sole American Manufacturers*

Factory and Main Offices: Trenton, N. J.

New York	Chicago	Los Angeles	Detroit
Cleveland	Kansas City	Seattle	Atlanta
Boston	London	Paris	Turin

THERMOID-HARDY UNIVERSAL JOINT

*Fanwise Construction for strength
Makers of "Thermoid Hydraulic Com-
pressed Brake Lining" and "Thermoid
Crolide Compound Tires"*

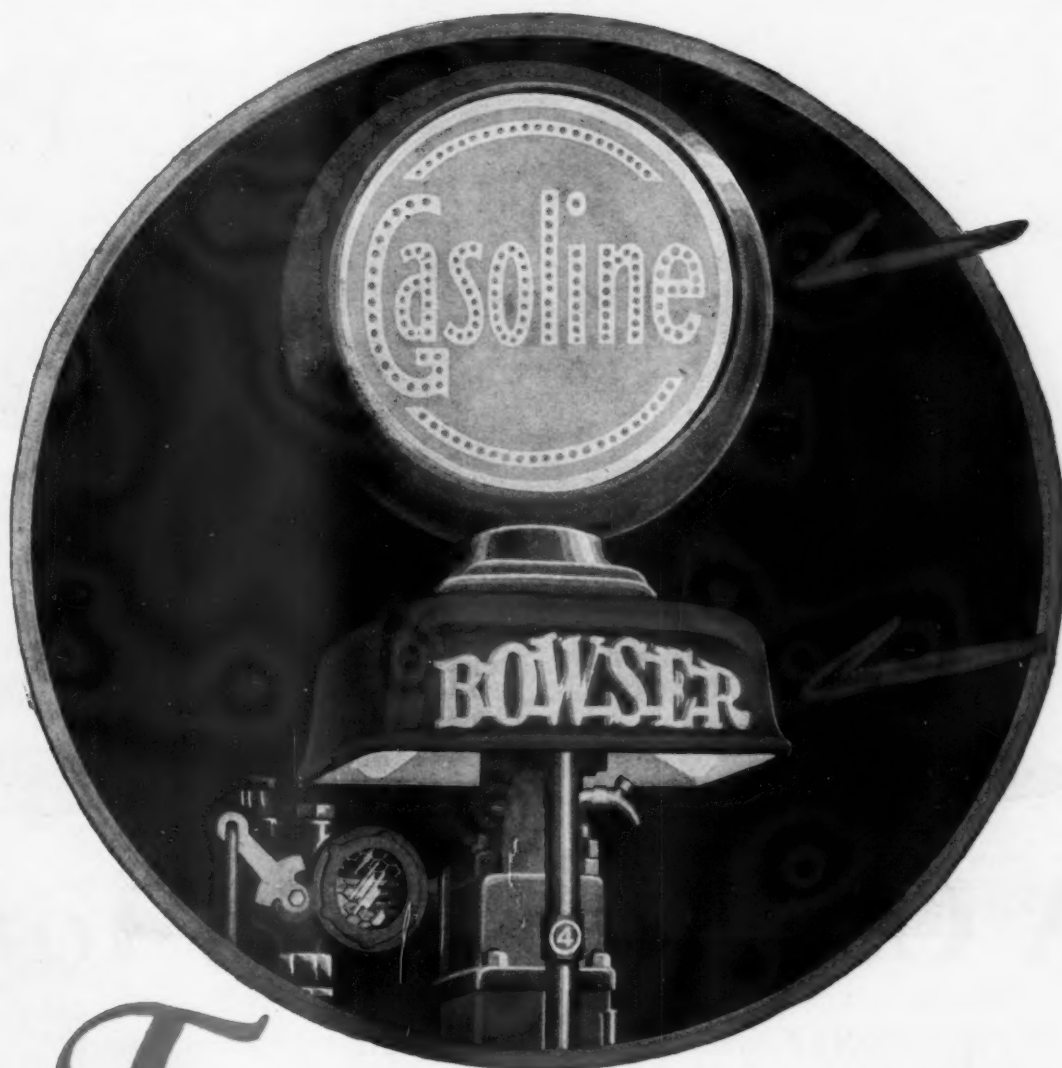


[A] An ordinary disc, its layers of fabric laid parallel. The three black holes are the driving bolts—the three white ones the driven. Notice that the left-hand driving bolt is the only one that can pull in the direction of the strands of cotton. The other two must pull on a bias. This stretches the whole disc out of true, causing vibration and "whipping" of the entire shaft.

[B] Fanwise Construction—showing how the layers of fabric are built up, leaving the strands of fabric in each layer running in a different direction.

LIST OF USERS

American British Mfg. Co.
Allis Chalmers Mfg. Co.
Anderson Motor Co.
The Autocar Co.
Available Truck Co.
Barley Motor Car Co. (Roamer)
Crow-Elkhart Motor Corp.
Jas. Cunningham Son & Co.
Dart Truck & Tractor Corp.
The Dauch Mfg. Co.
Diamond T Motor Car Co.
Doane Motor Truck Co.
Elgin Motor Car Corp.
Elgin Street Sweeper Co.
Fageol Motors Co.
Fifth Ave. Coach Co.
H. H. Franklin Mfg. Co.
Garford Motor Truck Co.
Gramm-Bernstein Motor Truck Co.
Handley Knight
Hawkeye Truck Co.
Hendrickson Motor Truck Co.
Highway Motors Co.
Holt Mfg. Co.
Indiana Truck Co.
International Harvester Co. of A., Inc.
International Motor Co.
Jackson Motors Corp.
Kelsey Motor Co.
Kentucky Wagon Mfg. Co., Inc.
Kenworthy Motors Corp.
King Motor Car Co.
King Zeitler Co.
Lakewood Eng. Co.
Larrabee-Deyo Motor Truck Co.
Lexington Motor Co.
Locomobile Co.
Menominee Motor Truck Co.
Mercer Motors Co.
Moreland Motor Truck Co.
McFarlan Motor Co.
Nelson & LeMoon
E. A. Nelson Automobile Co.
Nelson Motor Truck Co.
D. A. Newcomer Co.
O'Connell Motor Truck Co.
Oliver Tractor Co.
Oneida Motor Truck Co.
Packard Motor Car Co.
Parker Motor Truck Co.
Patriot Motors Co.
Reliance Motor Truck Co.
Reo Motor Car Co.
Reynolds Motor Truck Co.
Root & Van Dervoort Eng. Co.
Sanford Motor Truck Co.
Southwark Fdy. & Mach. Co.
Sprague Electric Co.
Stoughton Wagon Co.
Studebaker Corp.
Stutes Mar Tractor Co.
Templar Motors Co.
Tioga Steel & Iron Co.
Towmotor Co.
Traffic Motor Truck Corp.
Transport Truck Co.
Twin City Four Wheel Drive Co., Inc.
United Motors Co.
Walter Motor Truck Co.
Ward La France Truck Corp. Inc.
Watson Products Corp.
Geo. D. Whitcomb Co.
Wichita Motors Co.
H. E. Wilcox Motor Co.
J. C. Wilson Co.
Willys-Overland, Inc.
Zeitler & Lamson
Truck & Tractor Co.



These two words

first appeared together in the days when Elwood Haynes drove his "horseless carriage."

These words proclaim your ability to give that perfect gasoline service in which Bowser equipment has always led.

Booklet A-14 and the folder on "New Stuff" tell which Bowser pump can serve you best. Write today.

S. F. BOWSER & COMPANY, Inc.

Pump and Tank Headquarters

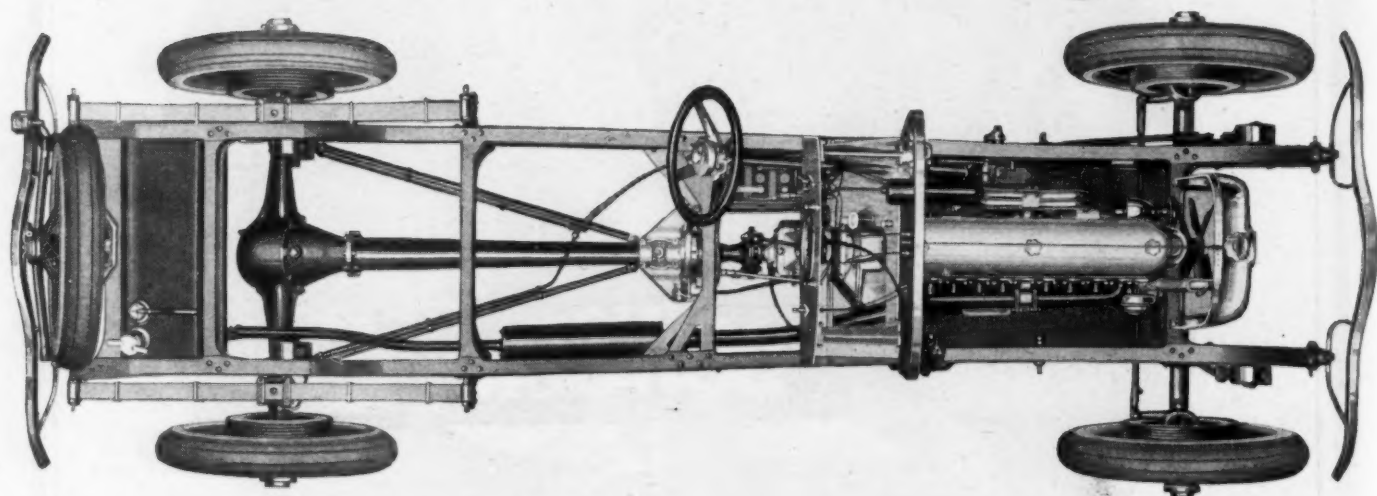
Home Plant: Fort Wayne, Indiana

• Canadian Plant: Toronto, Ontario

Factories and Warehouses: Albany, Dallas, Milwaukee, San Francisco, Sydney

Branch Offices, with Service Departments, in Principal Cities
in this Country and Abroad. Representatives Everywhere

The Grand Prix Car
DUESENBERG
Eight Cylinders in Line



A Car that Sells You

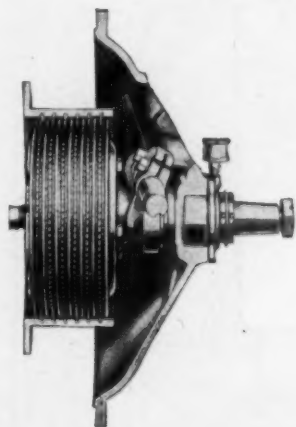
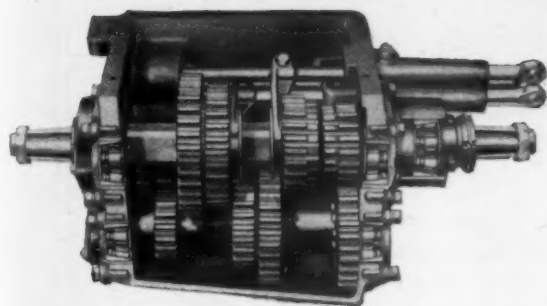
INTENSE interest, which you can capitalize, exists everywhere about the Duesenberg. It is the only car with the world-renowned *Straight-Eight* engine and wonderful *Four-Wheel Hydraulic Brakes*.

It is a completely matured car, benefiting from thrilling, victorious Duesenberg racing experience; as well as from years of the most intensive engineering development. In other countries the Duesenberg ranks as do a few famous importations here.

Imagine the prestige to be won with such a car in your salesrooms, and on the streets of your city. The appeal of the Duesenberg is to that class whose patronage is invaluable and profitable to you.

Duesenberg reputation and product offer alert dealers a powerful asset, which can be acquired under a particularly sound and liberal franchise.

DUESENBERG AUTOMOBILE & MOTORS CO., INC., *Indianapolis*



They Meet the Test of Hardest Service

HAULING great logs over clay and corduroy roads, through sand and mud, puts the greatest possible strain on a truck's transmission and clutch.

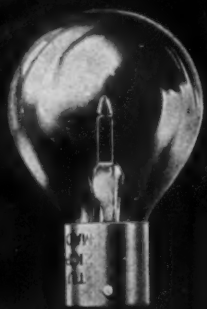
Because of their unfailing dependability in work like this, Brown-Lipe Gear transmissions and clutches have, for twenty-five years, been held in high esteem by both motor vehicle builders and users.

Of additional advantage is the quickness with which genuine, right-fitting Brown-Lipe Gear parts can be secured when accident or long, hard service makes replacements necessary.

BROWN-LIPE-GEAR TRANSMISSIONS

BROWN-LIPE-CHAPIN DIFFERENTIALS

Both at Syracuse, N.Y.



Quality



DURING the many years in which we have been building TUNG-SOL, our one aim has been to make them the finest lamps that skill and specialized knowledge can produce. That we have succeeded, is to point to the constant and insistent demand for TUNG-SOL lamps of Quality. Discriminating motorists depend upon TUNG-SOL to light "the way."

MINIATURE INCANDESCENT LAMP
CORPORATION, INC.

Newark

New Jersey

*Licensed Under General Electric Com-
pany's Incandescent Lamp Patents*

TUNG-SOL

"LET TUNG-SOL LIGHT THE WAY"



The Spiral Cut Ring
the ace of one-piece, high-compression rings. Electrically heat treated. Price \$1.00 and up.



The Oilless Ring
a one-piece, high-compression ring that also stops oil pumping. Electrically heat treated. Price 50c and up.



The StepSet Ring
a one-piece STEP-cut Ring tension SET by a new mechanical process. Price 30c and up.



Replacement Piston
a "true-to-original-specification" product made to fit any car. Prices and discounts on application.



Piston Pin
a high-quality product, glass-smooth, accurately machined. Prices and discounts on application.

Stock This COMPLETE Piston Service Line

Here is a wonderful opportunity for you to establish a profitable, **complete** Piston Service Station in your town! Inland now offers a full Piston Service Line—a superior Ring for every purpose and price, and a complete series of high-quality Replacement Pistons and Piston Pins.

Go after the big market for Inland Piston Products—there is a rich, steady harvest of profits awaiting you if you start now to build a solid business on this complete, high-quality line.

Investigate Now!

Dealers, Auto Parts Companies, Reborers, Re-grinders and Repairmen—this message means money to you! If you carry only part of the Inland line, round it out and increase your profits. If you want to stock this better and complete line, talk to an Inland jobber—in case you do not know his name, write us direct.

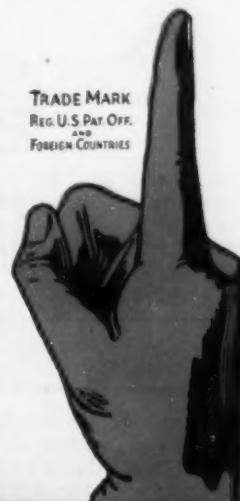
Our new booklet, "The Story with a Ring to It," tells the story of each of these celebrated Inland Products. Send for your copy now.

INLAND PRODUCTS COMPANY, INC.

Branches and Stocks in Principal Cities

Main Office and Factory: St. Louis, U. S. A.

TRADE MARK
REG. U. S. PAT. OFF.
AND
FOREIGN COUNTRIES



INLAND



UNIVERSAL

*piston rings
that answer
every need*

The Universal One-Piece Piston Ring with the Beveled Edge and the Oil Groove. Thousands in use—used by leading repairmen the country over. Oil collects in the beveled edge and is gradually forced down to the inner groove of the ring on the upstroke of the piston. When firing takes place oil is in the inner groove. This "forced lubrication" keeps the inner groove full of fresh oil at all times and forms an absolutely gas-tight seal.



Patented
July 20, 1920.

The Universal "Hy-Grade" Plain Peened Piston Ring. This ring answers the demand for a high-grade, accurately made plain ring at a reasonable price. Only the first quality individual castings are used in the production of this ring and each ring is subjected to the strictest inspection possible.

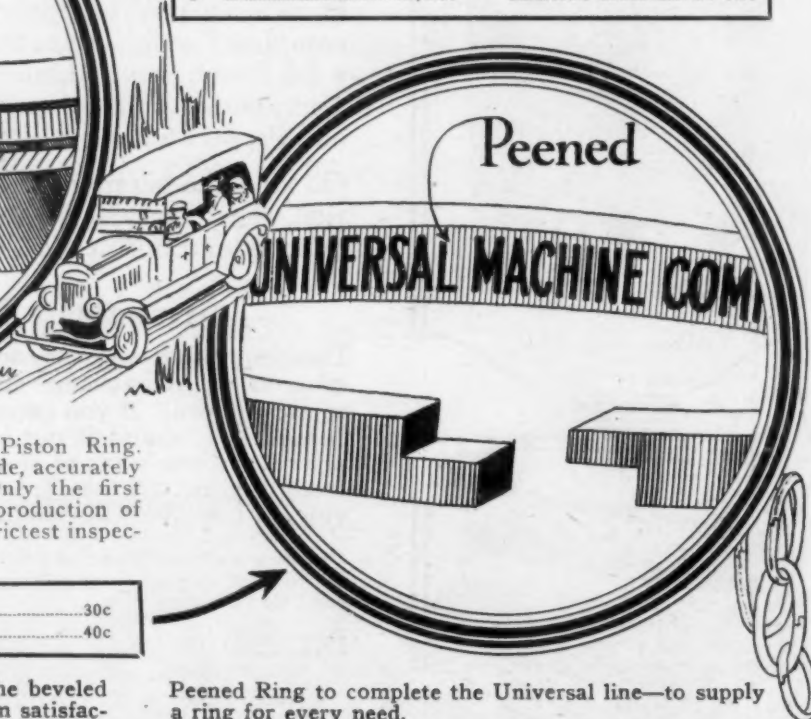
PRICE LIST

2 5/8" to 4", inc.	30c
4 1/8" to 5", inc.	40c

Thousands of Universal Piston Rings with the beveled edge and oil groove are in use giving uniform satisfaction. Hundreds of cylinder regrinders and repairmen use them with the certain knowledge of best workmanship, accuracy of manufacture and honest service. Now comes the new Universal "Hy-Grade" Plain

PRICE LIST

Ford Special	50c
2 5/8" to 4", inc.	60c
4 1/8" to 4 3/8", inc.	75c
4 1/2" to 4 7/8", inc.	85c
5"	\$1.00
3/8" width, any above diameters	\$1.00
1/2" width, any above diameters	1.25



Peened Ring to complete the Universal line—to supply a ring for every need.

The high standing of the Universal Machine Company and special machinery manufacturers is in back of every Universal Ring. The best ring at a reasonable price has been their byword—and they have attained it.

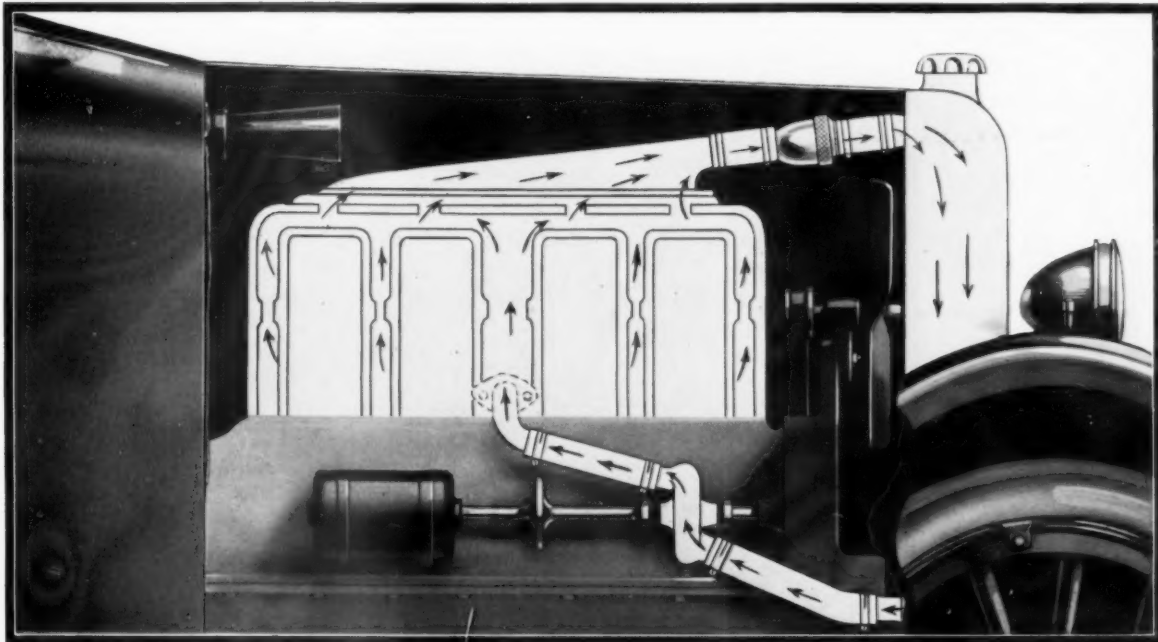
Get the Universal Proposition!

UNIVERSAL MACHINE COMPANY, Baltimore, Md.

UNIVERSAL

ONE PIECE PISTON RING

Heats the engine quickly in coldest weather



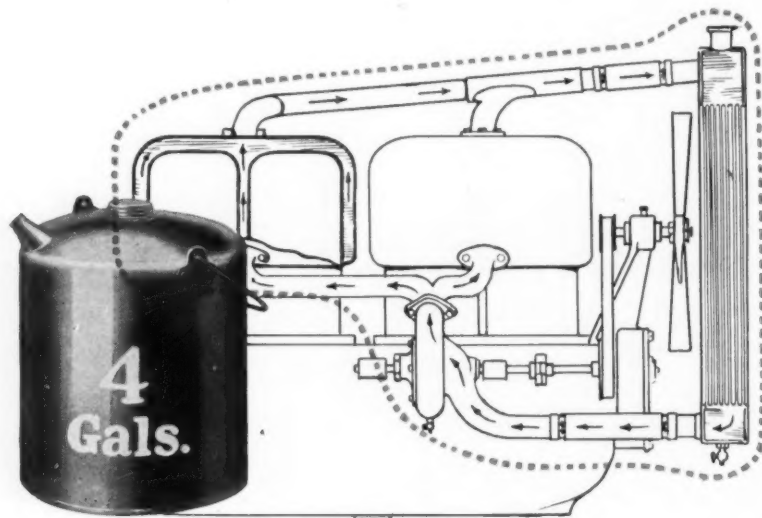
THE manufacturers of the world's most complete line of heating specialties announce the solution of a serious problem — *proper heating of the automobile engine in cold weather* — which has for years been the subject of study and research by leading automotive engineers.

The following pages tell why the Bishop-Babcock Aquastat assures "summer engine performance all the year."

THE BISHOP & BABCOCK COMPANY

CLEVELAND, OHIO

Which will heat



—four gallons of water

Usually the cooling system contains at least four gallons of water—sometimes more. When this is circulating around the engine block and through the radiator on a cold winter day it cools almost as fast as it heats. It takes a half hour or more to even warm the water.

AUTOMOTIVE engineers have long recognized the need for a simple, automatic method of holding the water around the combustion chamber until it is thoroughly heated.

Some higher-priced cars have, in fact, developed thermostat-operated methods for doing this but these installations have been too complicated and too expensive for use in the average car.

Now, with the Bishop-Babcock Aquastat, automatic control of the cooling systems of all cars using pumps is made possible.

Ends cold weather troubles

With a Bishop-Babcock Aquastat winter driving troubles are practically ended. When the engine is started on a cold winter morning, the water is held around the combustion chamber until it reaches a certain temperature. The engine is warm in less than five minutes.

No more sputtering and stalling for the first half hour, or hour, of driving. Use the choke or primer a few times, and the engine warms up immediately. In a few minutes it is purring as sweetly as on a hot summer day.

When the water reaches a predetermined temperature, the Bishop-Babcock Aquastat opens, letting out the hot water and letting in cold water

which in turn is quickly heated. The Aquastat is automatic in its operation, controlled entirely by thermostatic action.

A cooling-heating system

With the Bishop-Babcock Aquastat, the cooling system *remains* a cooling system when cooling is required—but *becomes* a heating system when heating is needed.

When the flow of water in the circulating system is throttled by the Aquastat, pressure of the water between it and the pump increases, thereby *decreasing* the power consumed by the pump.

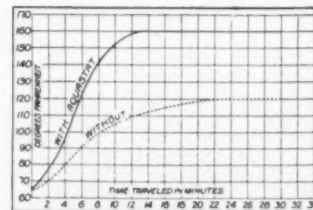
The Bishop-Babcock Aquastat secures and maintains a degree of heat in the water around the cylinders which can *never* be obtained on the coldest days without its use. And when the engine stops, cooling is greatly retarded, because the valve closes and holds the hot water around the cylinder block.

Bishop-Babcock AQUASTAT

Water temperature in cylinder head

Two identical test runs, with and without the Aquastat, were made on the same day, over the same route, at a very nearly constant speed of 25 miles per hour.

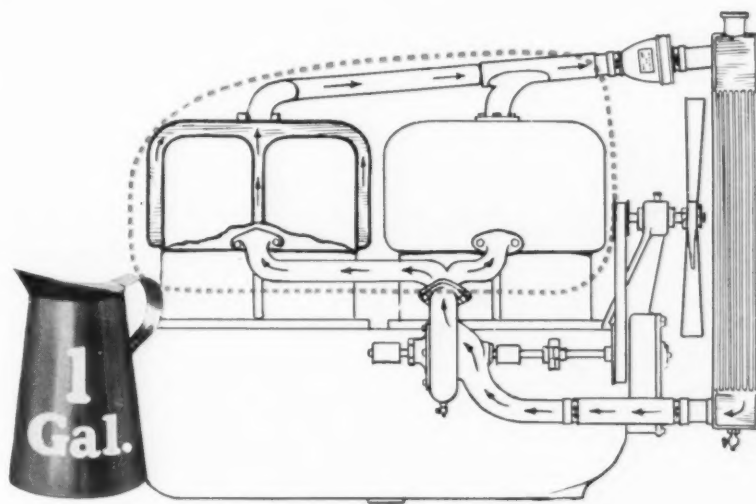
The chart shows clearly two results obtained by the use of the Aquastat: 1. Rapid increase in the water temperature at the start. 2. An increase of about 40 degrees in the "running" temperature of the water, even on a day when the mean temperature of the atmosphere was as high as 45 degrees.



more quickly?

—or one gallon of water?

The capacity of the water jacket space around the cylinder block, is approximately one gallon of water. If this water is held here by automatic control until thoroughly heated, certainly it will *heat* it in one-fourth the time required to *warm* the four gallons in the whole system.



What the Aquastat will do

The Bishop-Babcock Aquastat is guaranteed to produce these results:

- Adjust the water cooling system to seasonal requirements.
- Maintain constant temperature in the water surrounding the combustion chamber and cylinders.
- Prevent over-cooling of engine in cold weather.
- Warm up engine quickly in cold weather and reduce use of choke.
- Save fuel by preventing recondensation and reducing use of choke.
- Reduce carbon deposits from excess fuel.
- Prevent dilution of oil in crankcase by excess gasoline.

10% seepage checks freezing

To reduce the possibility of freezing, water in the radiator must be agitated or kept in motion. The Aquastat meets this need. *It allows a 10% seepage*

at all times. Thus the trouble caused by the "bypass" type of water control is entirely avoided. As soon as the engine starts, agitation of the radiator water begins and this danger of freezing is eliminated.

Operates on proved principles

The Bishop & Babcock Company for years have occupied a leading position as manufacturers of thermostatically-controlled heating specialties. The *principle* of the Aquastat is standard in the operation of thermostatic traps for large buildings.

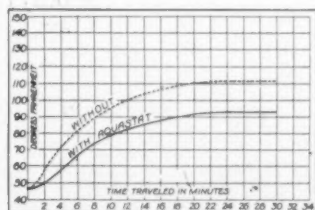
For several years The Bishop & Babcock Company has supplied elements for water control to manufacturers of high-priced automobiles. The experience thus gained, and the extensive engineering and manufacturing knowledge acquired in the heating field, brought about the development of the Bishop-Babcock Aquastat.

Easily installed in 10 minutes

It is easily installed. Just cut out a piece of the hose between the cylinder head and the radiator and clamp the Aquastat to the hose connections.

We welcome tests from manufacturers, engineers, dealers and owners. We guarantee satisfaction. Write for details to The Bishop & Babcock Co., Automotive Specialties Division, Cleveland, Ohio.

Summer Performance ALL THE YEAR



Water temperature in bottom of radiator

This chart, made from the same test runs, shows that the Aquastat maintains a temperature of the water in the radiator, just low enough to attain the desired temperature increase in the cylinder head water. At the same time enough water is admitted through the Aquastat from the very start to cause a rise in the temperature of the water, even at the bottom of the radiator.

Bishop-Babcock AQUASTAT

Retail Price, \$10.

Two Hose Sizes, 1¼" and 1½"

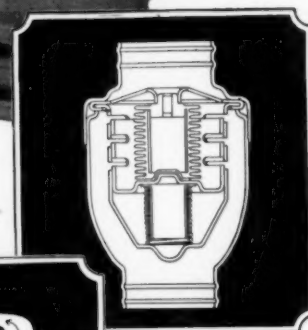
**We invite tests
of the Bishop-Babcock Aquastat
on the following Automobiles**

American	Marmon
Anderson	Mercer
Auburn	Mitchell
Buick	Moon
Chandler	Nash
Chevrolet	National
Cole	Oakland
Columbia	Oldsmobile
Crow-Elkhart	Packard
Davis	Paige
Dodge	Paterson
Dorris	Peerless
Elcar	Pierce-Arrow
Haynes	Premier
Hollier	Reo
Hudson	Roamer
Jackson	Stearns-Knight
Jewett	Studebaker
Jordan	Templar
Kissell	Velie
Lexington	Wescott
Locomobile	Wills St. Claire

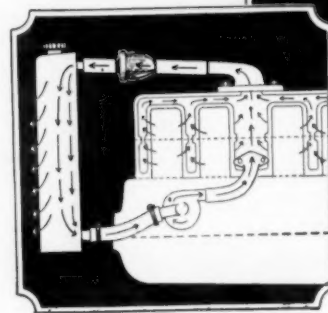


Patent Pending

Actual size. Weight, 10 ounces. Made of brass and polished aluminum, hand-somely finished. Made with 1¼ and 1½ inch openings. Easily attached and detached. Simple, positive, automatic, nothing to get out of order. Absolutely guaranteed.



Cross section of Bishop-Babcock Aquastat. Valve is perfectly balanced, and is operated by an expanding multiflex bellows, charged with a thermostatic fluid, and counteracted by a spring which holds the valve almost fully closed until temperature reaches a certain predetermined point.



Manufacturers

See the Bishop-Babcock Aquastat on exhibition at the Congress Hotel, Chicago, at the time of the Chicago show. Our Engineering Department will gladly co-operate with you in conducting tests to determine the efficiency, economy and serviceability of the Bishop-Babcock Aquastat. Write for test samples.

To the trade

A really worth-while opportunity is offered you in connection with the Bishop-Babcock Aquastat. Efficient in operation, easy to install and absolutely guaranteed, the Bishop-Babcock Aquastat is proving a big winter seller everywhere. Write for sample, stating make and model of your car (this applies to the trade only), and for Bishop-Babcock Aquastat sales plan.

THE BISHOP & BABCOCK COMPANY

Automotive Specialties Division
CLEVELAND, OHIO



An Attractive Distributing Proposition for Garage Men and Accessory Dealers

Experts have learned that 90% of all motor trouble and expense is caused by oil passing the piston rings and finding its way into the combustion chambers where it forms into carbon. The results are leaky valves, knocks, poor carburetion and loss of power. In addition the oil which may drain back through gravity into the crankcase is usually carbonized and diluted with gasoline.

The installation of ONE SAV-OIL Piston Ring on each piston will entirely overcome these faults. On the upward stroke this ring collapses slightly, leaving a film of oil on the cylinder wall. On the downward stroke the sharp edges of the ring scrape the oil back down and into the crankcase. The use of this ring means 1000 miles to the gallon of oil or better.

Write for literature and our very attractive proposition for distributors and dealers.

"The Only Ring with a Mileage Guarantee"

THE SAV-OIL RING MFG. CO.

1037 S. Figueroa St.

LOS ANGELES, CALIF.

Gill

Special

Servus

Dealers and garage men everywhere recognize the leadership of Gill Interlocking-Joint piston rings, in sales and satisfaction.

Now Servus Step-Cut rings, and Special Oil-Wipers, made by the same organization, are also winning dominance. The reason is that each of these rings is the best of its type that can be produced.

All three types are individually cast of the same special grey iron composition, unsurpassed for elasticity and long life. All three types of rings are lathe turned.

This assures absolute accuracy, and gives these rings their excellent quick-seating properties.

In any motor overhaul, one of these three types of rings can be depended upon to renew compression and correct lubrication troubles, with greatest economy.

Gill Interlocking-Joint piston rings, 75c.
Special Oil-Wiper piston rings, 50c.
Servus Step-Cut piston rings, 30c.

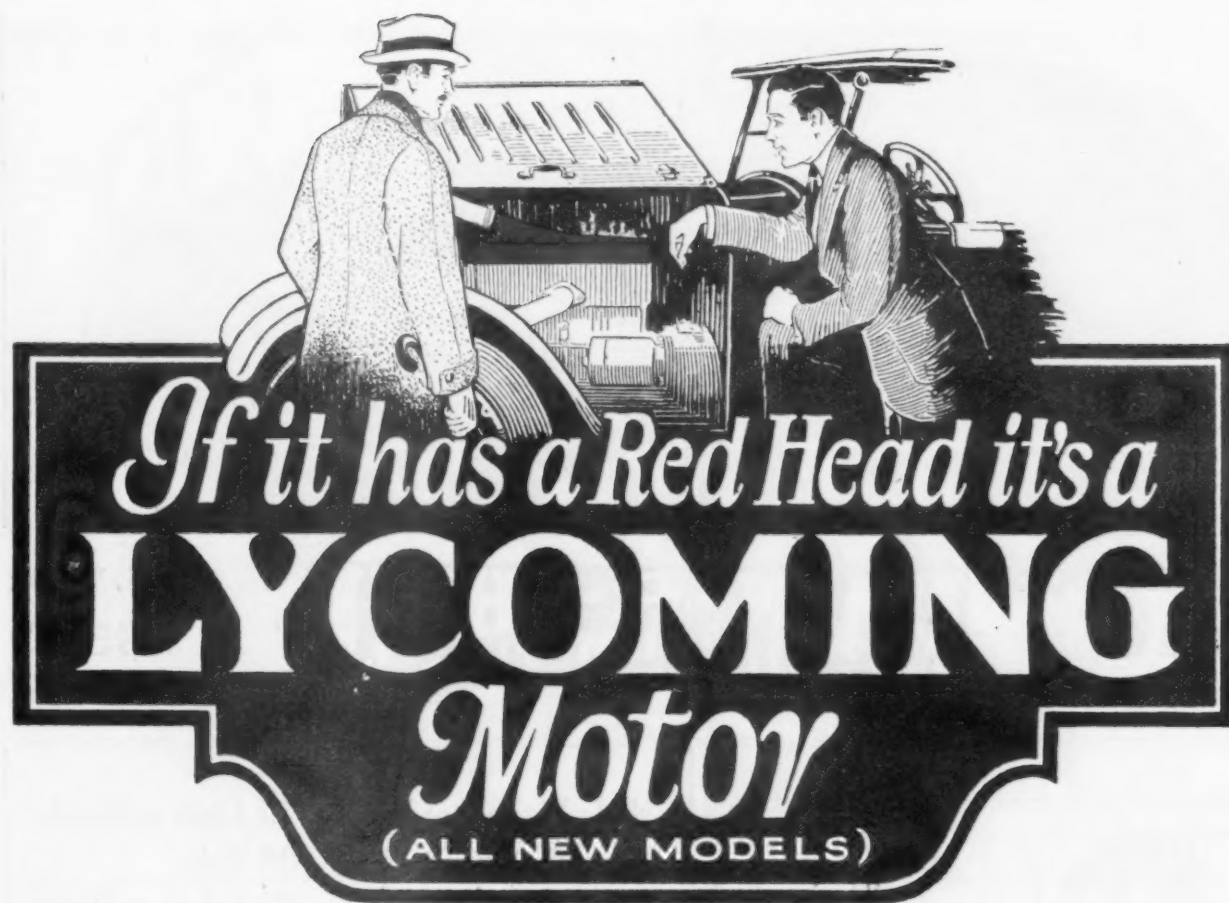
All sizes and oversizes quickly obtainable from large jobbers' stocks, supported by 36 factory branches.

GILL MANUFACTURING COMPANY

8300 South Chicago Avenue, Chicago

Eastern Headquarters—10 Central Park, West—New York City
Canadian Factory—415 King St. W. (Brown Engineering Co.), Toronto
Sole Canadian Distributor—Canadian General Electric Company, Limited
Export—American Steel Export Co., Woolworth Building, New York City





THE PURPOSE OF THE RED HEAD

The red head on all new Lycoming "Fours" is merely to identify them as Lycoming-made motors. It is used irrespective of size or specifications. Therefore, when seen in either passenger cars or trucks it may be on any one of four different models, solely for the purpose of indicating them as motors made by Lycoming.

There are a number of important departures from customary four-cylinder motor practice in the new LYCOMING Motors. Of particular interest are the five-bearing crankshaft, long connecting rods and other features which contribute to make these motors as flexible as an engine of more cylinders and as nearly vibrationless as is possible with present motor development.

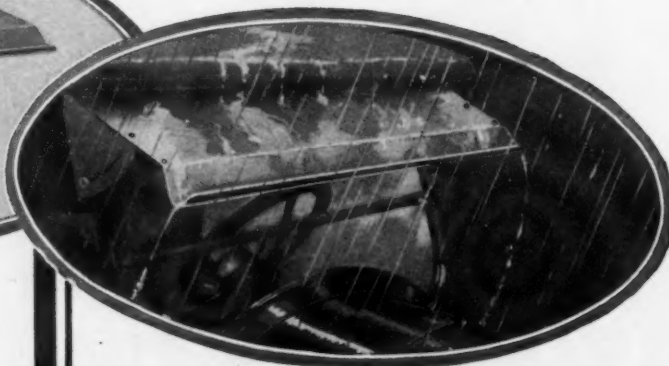
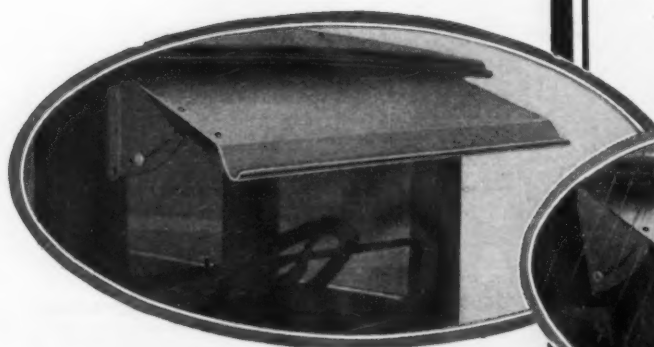
Complete details are available to responsible persons on request.

LYCOMING MOTORS CORPORATION

Williamsport,

Pennsylvania

The New **LYCOMING** *Motors*



ALUMINUM VISOR

\$10

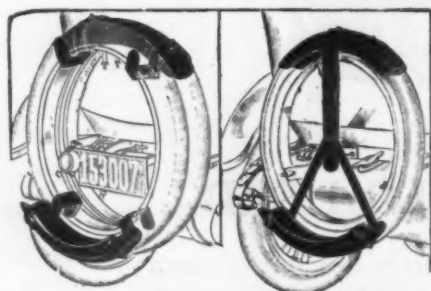
for All Cars

RAIN-R-SHINE
 ALUMINUM VISOR

STEEL VISOR

\$5

For Fords & Other Cars

**2-R-3 TIRE CARRIERS**

Mean 2-R-3 Profits

For Every Dealer Who Handles Them

This carrier simply hooks on the preceding tire and enables the car owner to carry as many spare tires as he wants. No installation is necessary. No tools, nuts or bolts to fuss with. Often paves the way for a dealer to sell a tire, tube, rim and lock. Two models. Will fit any tire, any car, and enables the motorist to carry all the extra spares needed.

Prices \$2.50 to \$7.00.

Your jobber can supply you.



Made Entirely of Metal No Glass to Break
Gutter Carries Off Rain

No Reflection No Fabric to Tear

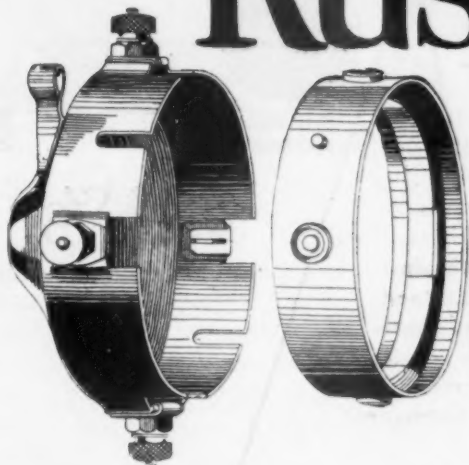
Another point of interest to both jobber and dealer is the exclusive adjustment feature. This makes it possible for you to carry two models, one for open cars and one for closed, and fit any windshield from 37" to 45" wide. This adjustment feature consists of eight rows of blind perforations (invisible until punched out) at either end of the visor. By punching out the proper row of perforations at each end the necessary space between brackets can be secured. You can fit any car neatly and individually. Also, you need carry only a small stock and your investment is correspondingly low.

From every standpoint you will find this visor a quality product and above most competition. Your jobber will supply you, or we will send you full information upon request. Jobbers—Write for details.

Manufactured and Guaranteed by

The International Stamping Co.
 406 N. Leavitt St. Chicago, U. S. A.

Announcing a complete Rush Timer



FOR FORDS
—The Dual Contact
Timer that will
not wear rough/
or corrugate!



The exclusive features of this complete Rush Timer eliminate timer troubles and create sales for you. The Rush Timer Roller is a thoroughly tried and proven product—its scientific principles of construction have demonstrated their superiority by years of actual service.

This famous timer roller is now embodied in a timer case with a detachable fibre contact ring. All parts are interchangeable and are sold complete or separately. Only the worn part need be replaced.

Rush Timers give long service because the dual contact feature prevents the timer track from wearing rough or corrugating. The flange on the roller gives a rolling, wiping contact that insures easy starting and continuous, accurate firing at all times. There is no bothersome oiling necessary—it runs in cup grease.

Our unqualified guarantee is behind our products. Our reputation has been built on our policy of entire satisfaction or your money refunded.

Capitalize the exclusive advantages of the Rush line of Ford necessities. Order now for prompt delivery.

Retail prices—Rush Timer complete, \$3.00; Timer Case, \$1.50; Timer Roller, \$1.50; Replacement Ring, \$1.00. The discounts are liberal and the turnover is fast.

ASK YOUR JOBBER

W. S. Rush & Co.

Manufacturers of Rush Adjustable Brake Shoes
Rush Transmission Band Oiler and Cooler

112 NO. DALY STREET

LOS ANGELES

S. S. McClelland Co.

Distributors East of Mississippi

1926 BROADWAY

NEW YORK CITY

Exclusive RUSH FEATURES

that will build
sales for you

1. Timer track will not wear rough or corrugate.
2. Runs in cup grease—eliminates oiling.
3. Dual contact insures easy starting and accurate firing at all times.

IT SELLS FOR

\$3.00
complete

Meilicke

**Both you and your customer
can trust this signal**

You can trust it because it is made by a firm that has been in business for many years and intends to stay in business for many more, therefore cannot afford to offer shoddy goods. Your customer can trust any Meilicke Signal because it is made of the best material obtainable in the best way known, and guaranteed without reservation against any fault of material or workmanship as long as it is in service. Meilicke Signals are the sort of merchandise that gain good-will and bring a permanent stream of profits.

Back-Stop combines the stop signal, a powerful white backing light and a standard size tail light in one neat serviceable unit. The backing light pays for the whole signal many times over by preventing bruised tires, blown-out tubes, bent fenders and dented panels. It has often saved motorists from being stalled all night when turning in a narrow road.

The brilliance and unusual shape of the stop signal violently arrests the attention of the following driver, giving him plenty of warning.

Check-Lite shows the driver that his signal is in proper condition; that the man behind has been given due notice. It is an ornament to any instrument board; installation requires boring only one hole. It uses no additional current because no resistances or transformers are needed. A signal system can only be as reliable as its weakest link. That is why we make our own brake switch.

Your jobber can tell you all about the full line of Meilicke Signals. There is one for every possible buyer. Send the inquiry immediately.



Back-Stop

with Tail Light

Check-Lite

TO
BATTERY



**MEILICKE CALCULATOR CO.,
944 WRIGHTWOOD AVE.,
CHICAGO ILLINOIS**

Signals

HOW NASH RECOGNIZES THE WOMAN DRIVER.

Steering made unusually easy by new standard equipment on the SIX.

Backing out of garages, driving in traffic, and taking a trick at the wheel on tours have changed women's buying attitude toward automobiles.

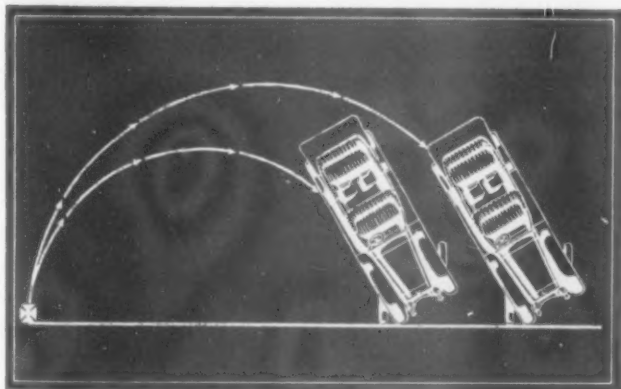
Pleasing her eye is no longer enough. Her hands and arms have to be taken into consideration too.

The steering gear is one mechanical feature in which she will have a lively interest when the family's next car is bought.

Why Nash chose Oil-Kipps

Hard steering is practically always due to poor lubrication of knuckles and tie rods.

The Nash organization long ago decided that oil was the only thing that could succeed where grease had always failed.



Relative turning radii of a car before and after equipping with Oil-Kipps. With Oil-Kipps on the steering gear, the car turns so much more easily that it can be brought about in a much smaller radius.

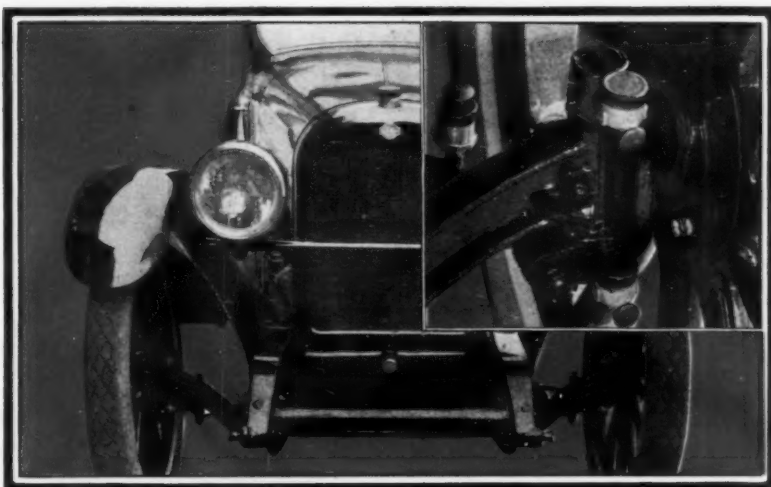
To them the problem soon narrowed down to this:

What is the right device for lubricating tie rods and steering knuckles with oil?

With the usual Nash thoroughness they investigated, experimented, tested and re-tested.

After eighteen months they were all agreed that there was one clearly satisfactory solution for their problem.

That solution is the Oil-Kipp — now standard equipment on the steering gear of the Nash Six.



New, improved aluminum Oil-Kipps are standard equipment on the steering knuckles and tie rods of the Nash Six. Over 1200 pounds of pressure can be developed in these Oil-Kipps by merely pumping them with the palm of the hand; almost unlimited pressure is available for clogged bearings.

What Oil-Kipps are

Each Oil-Kipp consists of a complete pumping unit contained in a die-cast aluminum cup carrying several months' supply of heavy oil. No gun or auxiliary pressure booster is necessary.

They are operated by merely pumping the spring plungers or pistons.

Their success in forcing heavy oil all around tight fitting bearings is due to a simple hydraulic principle.

The outstroke of the plunger creates a vacuum in the barrel, so that oil is sucked into it from the cup.

The instroke of the plunger puts this oil under pressure, because the plunger is so small in diameter that each pound of pressure exerted on the handle means a great many pounds in the pump.

What Nash Dealers are doing with Oil-Kipps

With them, tie rods and steering knuckles can be lubricated in one minute, even by a woman.

Because of the size of the new Oil-Kipps, they carry enough oil for several months. They can be easily refilled with an oil can containing heavy oil.

Nash dealers who have seen the equipment are so pleased with its appeal to women drivers that many are ordering Oil-Kipps to be put on older cars.

A set of Oil-Kipps can be installed on the steering gear in twenty minutes.

A number of Nash distributors are already carrying stocks of them and orders from others are coming in.

Where distributors have not yet received their stock, we can arrange direct shipments. When writing, please give the name of your distributor.

MADISON-KIPP CORP., MADISON, WIS.

Nolan Smith & Co., Sydney, Australia, Wm. Couthard & Co., Ltd., Carlisle, England



Oil-Kipps

MAKE STEERING EASY



The Oil Ring That Satisfies!

IT'S A PLEASURE to overhaul a motor if its going to give satisfaction when you've finished. But how many times do you *know* that its not going to pump oil?

Old motors generally use too much oil, causing fouled plugs and excessive carbon. Repairmen who have learned how PERFECT CIRCLE Oil-Regulating Piston Rings solve this oil problem, *know* that their jobs won't come back for oil trouble.

PERFECT CIRCLE Oil-Regulating Rings give an oil mileage of 1000 to 1500 miles to the gallon in any motor—and at the same time maintain proper cylinder lubrication. There's profit as well as satisfaction to be gained by installing them. Write for a trial set today.



PRICE \$1.00 EACH

Up to and including 5 in. diameter



PISTON RINGS

Marketed through recognized automotive jobbers, only.

Indiana Piston Ring Company

Hagerstown, Indiana

Harkrader & Harkrader: *Western Sales Agent, 1603 S. Michigan Ave., Chicago*

A Better Compression Ring

THE IMPROVED design of the PERFECT CIRCLE Compression Ring makes this ring hold compression and prevent raw fuel from entering the crankcase, more effectively than ever before.

The annular groove now turned on the face of the compression ring midway between its edges, serves as an oil reservoir, and helps seal the ring against loss of power and compression.

PERFECT CIRCLE Compression Rings are absolutely round, insuring uniform radial pressure. They are free from edge-warp—and made from individual castings.

The use of these rings insures maximum compression, a corresponding increase in power, and a minimum dilution of crank case lubricant. Write for a trial set today.



PRICE 25c and up



PISTON RINGS

Marketed through recognized automotive jobbers, only.

Indiana Piston Ring Company

Hagerstown, Indiana

**The Better
Gasoline Gauge
for Chevrolet 490
and Ford Cars**

**"The Shape
of the Humps
Tells the Story"**

\$2.00
for Chevrolet 490

The LEE Day-Night Gasoline Gauge for CHEVROLET CARS

Fits All 1923 Models and 1922 Closed Cars

HOW much gas left in tank?"—The *Lee Day-Night Gasoline Gauge* tells you—*instantly and accurately—in the daytime or on a pitch-black night.* No fumbling for matches, no guesswork. A glance at the Lee Gauge in the daytime, or a touch of the fingers upon its face at night and you have an accurate reading—**ALWAYS.** *The shape of the humps tells the story.*

**Read it with your eyes in the daytime.
Read it with your FINGER-TIPS at night!**

Beautifully finished in polished aluminum—sturdy, simple and trouble proof—the *LEE DAY-NIGHT GAUGE* is built for lifetime service. To install, merely insert in the filling hole in place of present tank cap. *Price complete \$2.00.*

CHEVROLET DEALERS:—Here is a quick-moving, profitable, absolutely reliable accessory. Order one or two dozen today—through your jobber or direct.

TO FORD DEALERS

The *LEE DAY - NIGHT GAUGE* for Fords is one accessory that **MOVES.** Eliminates the bother of taking out the seat and using a stick. The driver merely reaches his hand under seat, touches the face of the gauge and knows instantly how much gas is in tank. Ford gauges for any size tank.

\$1.50

To install just screw the gauge in place of the present tank cap. Quick sales—good profits. See your jobber or write us at once.

THE COLUMBUS COMPANY

Dept. A—314 East Broad St.

Columbus, Ohio

Do you sell at a big Profit, or just at a Profit?

Frequent profit is big profit. What shall it profit a man if his shelves are bending under long-discount stuff that doesn't move?

Monogram Junior sells easily and often—**there's** the big profit.

Your Monogram distributor will fill your order.

GENERAL AUTOMOTIVE CORPORATION
625 West Jackson Boulevard
Chicago, Illinois



See It At The Shows

MONOGRAM JUNIOR

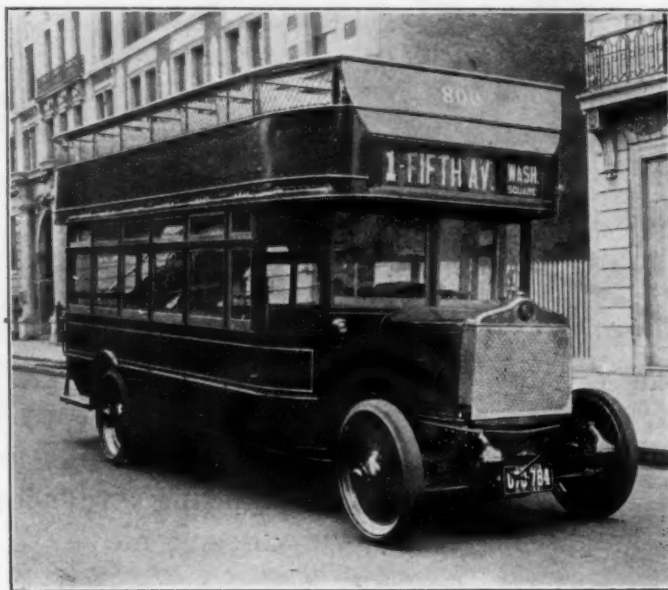
Self Locking Radiator Cap

FOR FORD
Chevrolet 490
Overland 1923

Star
Gray



ZENITH



No organization in America has had more actual experience in motor bus operation than the Fifth Avenue Coach Company of New York; and no bus built is designed with a greater knowledge of performance, costs, and results than the Fifth Avenue Busses.

Performance alone dictates the design and equipment of these busses; and not guesswork but accurate records led them to use Zenith Carburetors.

For only Zenith design can meet their demands fully—quick pick-up; smooth running, idling or working; faultless performance in congested traffic; uninterrupted service; and maximum mileage in every kind of weather.

You, too, can have these advantages. Every Zenith is built on the same principle; and there is a Zenith for every motor, whether in passenger car, truck, airplane, or motor boat.

Let us show you what it means to you.

ZENITH CARBURETOR CO.

FACTORIES AT:

DETROIT

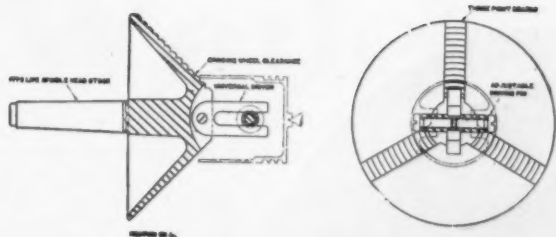
LYONS

LONDON

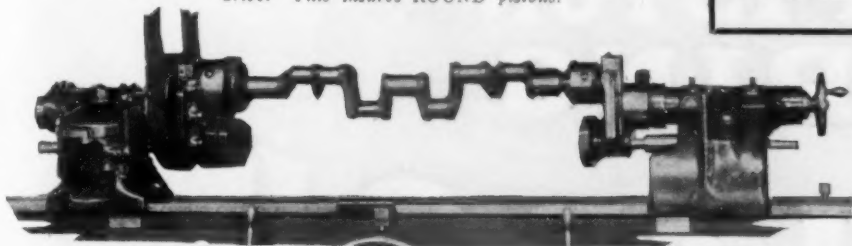
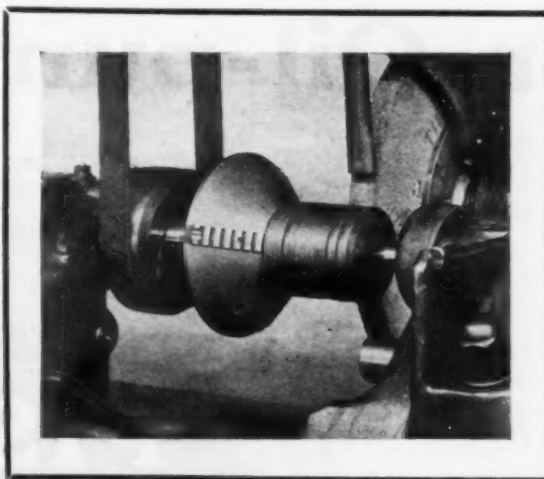
TURIN

BERLIN

Chicago Show Headquarters: Auditorium Hotel



The Landis center for holding and driving pistons. Three-point bearing holds piston concentric with inside surface of casting. Prevents thin-wall—thick-wall pistons. Note piston drive. This insures **ROUND** pistons.



To the left is shown a crankshaft in position to be ground on the pins. Note counter-balanced chuck at each end. The work-rest is not shown in this view.

Compare the LANDIS

Max. distance between centres	69"
Grinds, with 18" wheel.....	10"
Grinds, with 24" wheel.....	4"
Work swing over table with water guard removed.....	17½"
Smallest graduation of hand wheel feed .....	.001"
Swivel table graduated to grind included angle of.....	14½ degrees
Headstick swivel graduated to angle of	90 degrees
Net weight	8200 lbs.

PISTONS, CRANKSHAFTS, what ever comes—

Pistons ground from semi-finished castings on the Landis 4-A Special Repair Shop Grinding Machine are sure to have walls of equal thickness all round. The Landis Piston Holding Fixture assures this—also makes chucking a piston a matter of seconds.

When it comes to crankshafts, they are gripped in 3-jaw chucks at both ends—and supported by special steady rests close up to the bearing being reground. Result—no distortion, all bearings parallel.

For regrounding the pins, no throw blocks are needed. Instead, the 3-jaw chucks slide out to the required position.

The Landis is not a manufacturing grinding machine—it is built **ESPECIALLY** for automobile repair work. Auto mechanics can produce accurate work on it.

Back of any Landis—there is Landis Service to users—a guarantee of helpfulness in emergencies.

Before you buy ANY grinding machine be sure to see a Landis in operation and get Landis prices. You are invited to write us.



LANDIS

LANDIS TOOL COMPANY, Waynesboro, Pa.

New York Office—51 Chambers Street

For Oil-pumping Motors



DISTRIBUTORS, you will be interested in the Oiltrol Piston Ring—its selling features—and our Special Distributing Plan for 1923.

Full data sent on request.

Price 50c up to 4 inches
(inclusive)

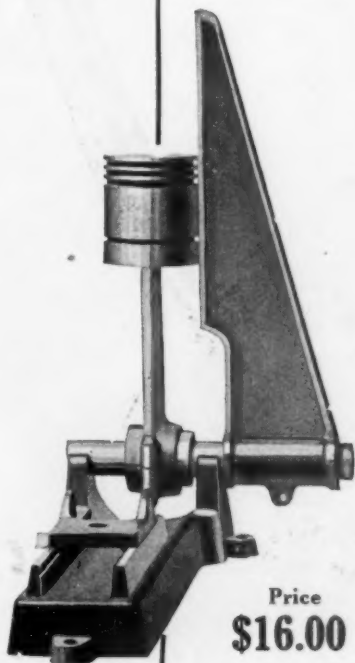
OILTROL PISTON RING COMPANY

2320 North Second Street

PHILADELPHIA, PA.

Waller Products

PROFIT BOOSTERS FOR THE AUTOMOTIVE DEALER



Price
\$16.00

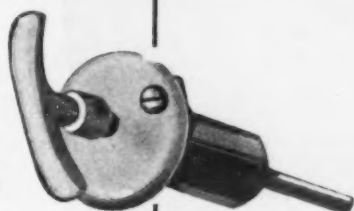
WALLER

Connecting Rod and Piston Aligner

Every time there is a complaint and a "make-good" on an engine overhaul job you lose the profit you have made on the job because you have to correct the trouble **on your own time**. There is only one sure way of preventing the "comeback." Check each part as it is replaced and then you **know** every part is in alignment. This not only insures your profits but also insures the good will of your customers.

The **WALLER** Connecting Rod and Piston Aligner is a precision jig which detects instantly pistons worn out of round or bored crooked, bends or twists in connecting rods, over and under lengths and any misalignment within .001" in the piston and rod assembly. Crooked rods can be bent to perfect alignment right in the jig.

The low price of \$16.00 for the complete equipment with Ford size arbor is made possible by the simplicity of design and our large production. Bushings for other size crankshafts are \$1.00 each. By preventing just one "comeback" this equipment will more than pay for itself.

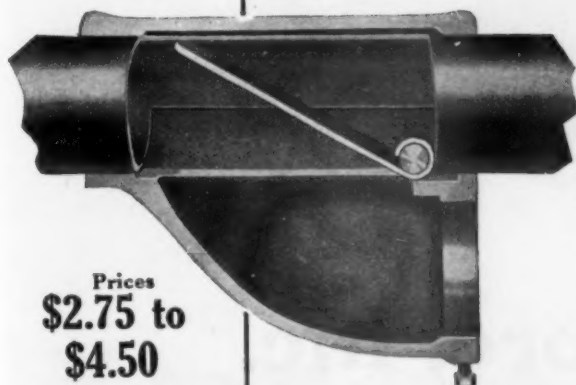


Price
\$1.75

WALLER

Dash Control

A neat, handsome piece of equipment that is an ornament to any instrument board. Can be used for operating radiator shutters, heaters, cut-outs, etc. Strong, durable and positive in action. All parts showing are highly polished aluminum.



Prices
\$2.75 to \$4.50

According to Size

WALLER

Universal Cut-Out

Can be used either as a regular cut-out or as a valve for an exhaust heater. Can be changed from one to the other in a few minutes. This double purpose makes it unusually popular and a year round seller. It is not necessary to cut the exhaust pipe in two to install. Everything is entirely enclosed—cannot clog with mud or dust. Easy slope of the flap prevents back-pressure. Flap of heavy steel, body of cast iron, lever of malleable. **WALLER** Dash Control furnished without extra cost except with 1½" size (for Fords).

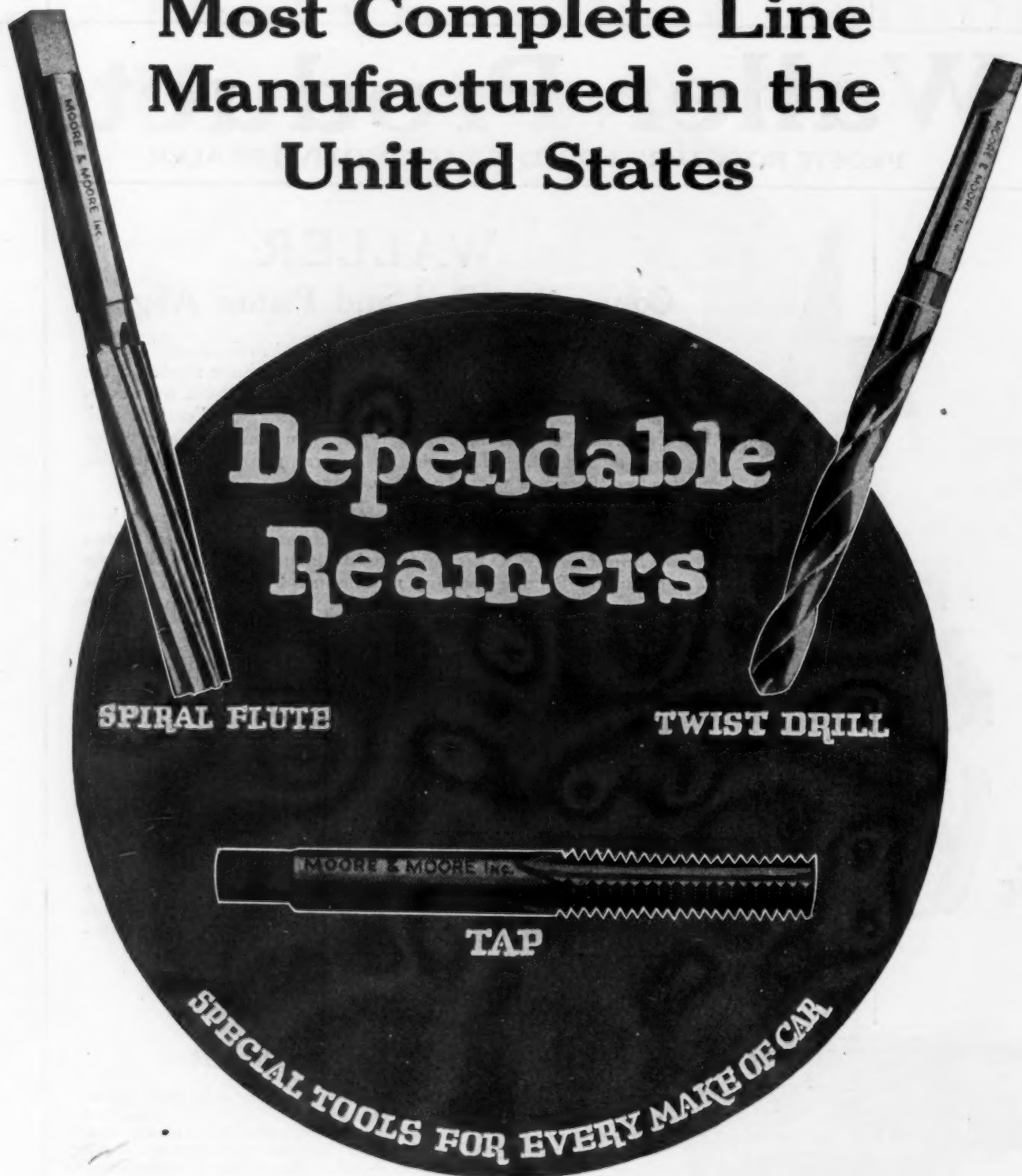
WALLER MFG. COMPANY

Oelwein, Iowa

The Clucker & Hixson Co., Sales Representatives,
47 Murray St., New York 52 E. 11th St., Chicago

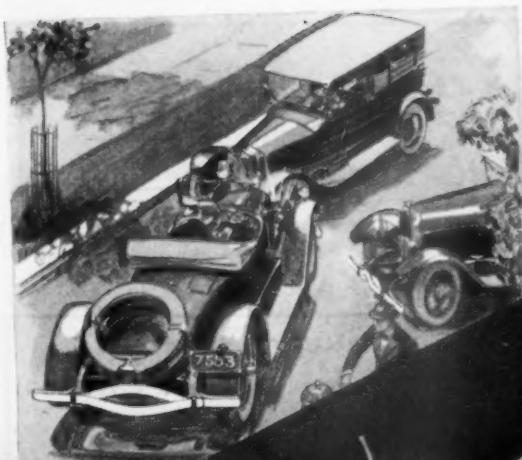
Your Jobber Will Fill Your Order Promptly

Most Complete Line Manufactured in the United States



Moore & Moore, Inc.

Reading, Pa.



The New Lyon Vanguard

New York Voted "Yea"

Lyon Spring Bumpers once more score a big hit. This time it's the Lyon Vanguard—a beauty—built for folks who want a moderate-priced bumper that combines good looks with real Lyon protection.

New York show-goers—both dealers and car owners—voted instant and enthusiastic approval of the Vanguard's graceful, broad-face design; its sturdy, rugged construction and its popular price of \$16.50.

The Vanguard has the famous Lyon-patented two-piece construction. Like all Lyon Spring Bumpers, it is made of the finest spring steel, oil tempered and heat treated. So even after a severe shock it retains its shape and springing quality.

Get acquainted with the Vanguard—make it your leader. At \$16.50 no other bumper can approach it in beauty, strength or protection. Write your jobber for prices.

Other Lyon Bumpers retail from \$10 to \$25

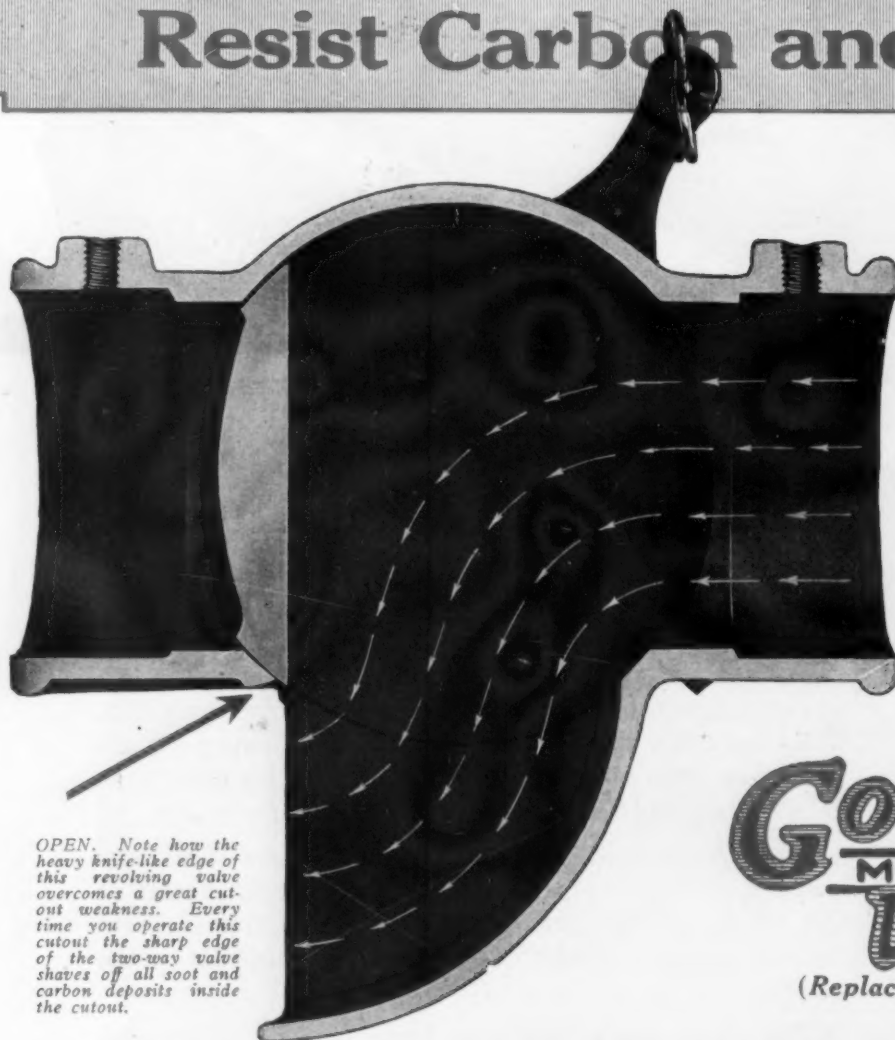
JOBBERs: We are ready to make immediate deliveries on the Vanguard. Write for information.

METAL STAMPING CO., Long Island City, N. Y.

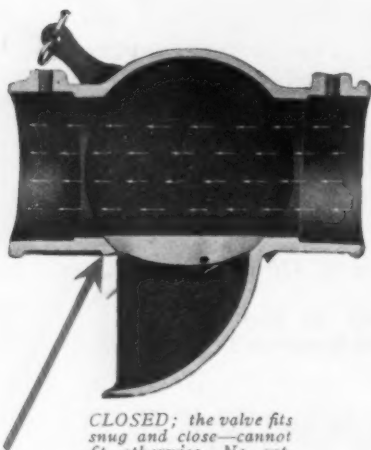
LYON RESILIENT BUMPERS

Retail Price
\$16⁵⁰

Scientifically Designed To Resist Carbon and Heat



OPEN. Note how the heavy knife-like edge of this revolving valve overcomes a great cutout weakness. Every time you operate this cutout the sharp edge of the two-way valve shaves off all soot and carbon deposits inside the cutout.



CLOSED; the valve fits snug and close—cannot fit otherwise. No rattles! No escaping gas to cause annoyance.

Study These Six Features

- 1 Very light in weight. No strain on the exhaust line.
- 2 The Goodrich revolving two-way valve. The knife edge cuts off the carbon every time it is moved.
- 3 No chatter from back pressure. Spring pulls valve back into place, but valve does not depend on spring to hold it there.
- 4 Extra long shank insures rigid support and perfect fit on exhaust pipe.
- 5 Connecting parts all jig machined makes perfect fit. No rattles. Parts interchangeable.
- 6 Bell mouth opening insures loud, sharp notes.

Each Cut-Out packed in an individual carton, complete with pulley, cable and pedal, ready for installation. No extra parts to buy.

Goodrich

MOTOR TESTING

Valve

(Replacing Old Style Cut Out)

WHAT CAUSES so many cut-outs to rattle after a few months' service? What causes that annoying put! put! of escaping exhaust when the cutout is supposed to be closed?

Carbon! Soot! Road dirt! It packs in and around the valve or flapper seat of the cutout, and the valve can't fit snug and true. It remains partly open. It chatters. It rattles. It leaks.

A cutout to remain efficient must resist carbon deposits. The Goodrich Motor Testing Valve was specially designed and developed to meet this common cutout weakness. Instead of the usual flapper or butterfly valve, it utilizes a re-

volving two-way valve. Carbon deposits cannot affect it, because all carbon deposits are cut free every time it is operated. Rattles cannot develop, because this type of valve must always fit snug and close—can't fit otherwise.

Guaranteed for the life of the car. Used by thousands of enthusiastic owners everywhere. Made in all sizes for any make of car or truck. Small size, \$3.00, complete. Larger sizes, priced in proportion.

DEALERS: Any good jobber can supply you, or ask us for name of nearest jobber. Window displays and counter literature sent free upon request.

Goodrich-Lenhart Mfg. Co.

22 Pine St.

Hamburg, Pa.



Clear Vision
Safe Driving

Correct Adjustment
Pleasant Driving



Exclusive Design
Our Own Invention

Touring
Model
A-1



Coupe
Model
C-1



The Chief
is positively
non-vibrating

Sedan
Model
B-1



Ask for
our free
catalogue

The complete line of "CHIEF" models will be displayed at the Chicago Show, The Coliseum, Booth 20, January 27th to February 3rd.

"CHIEF" MIRRORS—THE TRIUMPH FOR 1923

Adopted by the manufacturers of many of the finest cars as **STANDARD EQUIPMENT**

Adopted by the U. S. Government as **STANDARD EQUIPMENT** for all passenger cars, closed and open

Accepted by the leading, recognized wholesale houses as the **STANDARD, QUALITY MIRROR** for their 1923 catalogues

BECAUSE—

"CHIEF" MIRRORS represent **SUPERIORITY** in construction, quality, appearance, popularity and utility.

"CHIEF" Brackets are substantial in construction, neat in design and interchangeable on any model, thus making a "CHIEF" available to every car owner regardless of the model of his car.

Every "CHIEF" is adjustable to any angle without the aid of tools and will stay adjusted, without vibrating, and is always rigid.

The finest grade crystal plate glass, hand polished, with slightly beveled edge and "Grade A" silvering, is used exclusively. A special process protects the mirror from the elements and prevents peeling and sun spots.

As illustrated below, the "CHIEF" can be adjusted at the proper angle to give you direct rear vision regardless of the height or position of the rear windows. This is possible because of the careful designing of the brackets. The swivel-joint bracket is so flexible that it can be adjusted to give direct rear vision as well as adequate vision to the driver. Once adjusted the "CHIEF" stays put.

Wise drivers are replacing the mirrors in their cars with "CHIEFS"—for safety, appearance, utility and convenience. They cost a little more because they are worth more—to you and to the driver behind you.

"CHIEF" MIRRORS are available at all high-class accessory stores and in most high priced car show rooms. If you can't buy a "CHIEF" in your town, write and tell us.

Write for Catalogue

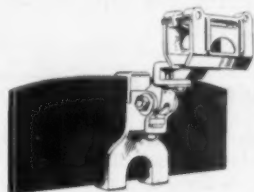
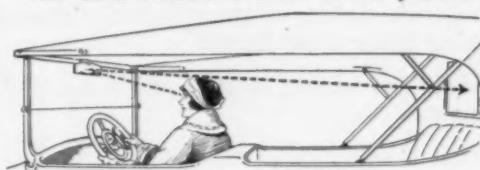
Manufactured by

Britton Auto Products Co., Inc.

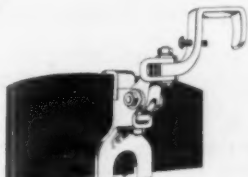
117 West 63rd Street

New York City

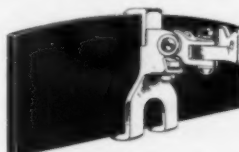
All Chief Mirrors Can Be Correctly Focused



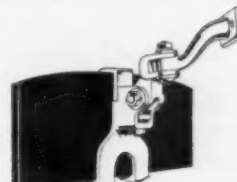
Touring
Model
A-1



Roadster
Touring Model
A-3



Sedan
Model
B-1



Coupe
Model
C-1



Illuminated from inside, its dial is clearly visible at night. The front frosted glass makes an economical parking lamp, while greatly adding to its ornamental character.

H. T. S. INDICATOR

Gives day and night warning

Do you know a car owner who *doesn't* drive at night?

WHEN darkness comes do you see all motoring stop? Are the roads deserted and all cars put away as soon as the sun goes down?

Why have headlights, tail lights, spot lights, dash lights, tonneau lights, trouble lights, cowl lights, side lights, courtesy lights, signal lights, parking lights, dome lights?

Solely and wholly because people use their cars at night.

That is one of the explanations for the quick and widespread popularity attained by the H. T. S. Indicator—the engine thermometer that gives day AND NIGHT protection against overheating. It lights up *inside*—you don't have to throw a spot-light or cowl light on it, or drive up in front of a lamp post, to see what it says. Its warning is as visible and unmistakable at night as in the daytime. With its light also shining through the frosted glass on the reverse side, it makes a battery-saving parking lamp for the front of the car.

The H. T. S. Indicator has no moving parts to become deranged. It is what any temperature

recorder *should* be: a THERMOMETER of the highest grade, made with the greatest accuracy, and using the finest quality thermal fluid obtainable. It has a long stem that reaches right down into the water, thus instantly registering every change in motor temperature. It is on the radiator cap, where it looks best and does not require the driver to take his eyes from the road. You don't have to find a place for it on an overcrowded instrument board.

Monogrammed Indicators are great sales builders. We supply you with decalcomania monograms of car nameplates, lodge emblems and other insignia, and you can apply them at the time you sell the Indicators. If you prefer, we will furnish Indicators already monogrammed.

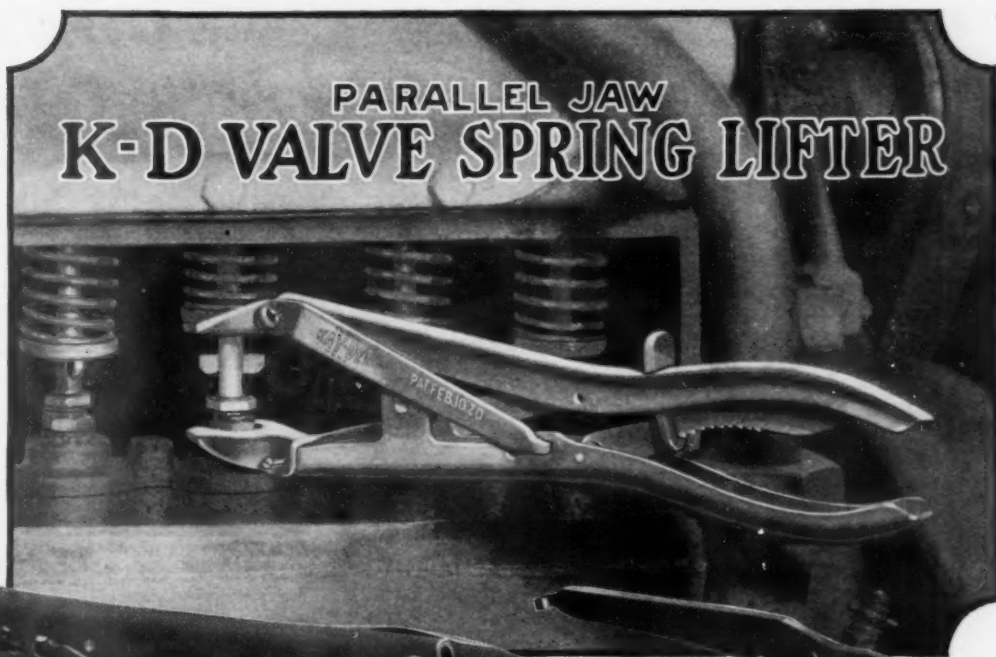
Complete Price \$10.00

H. T. S. Indicators are of such surpassing beauty and workmanship that a counter display never fails to attract great attention and keen interest. Selling at a competitive price, its very obvious superiority makes it immediately the choice of all who see it. A highly profitable line for jobbers and dealers. Discounts are right. Full particulars, write today to the H. T. S. Indicator Company, Chester, Pa.



Note how the jaws remain parallel throughout the entire lift. This exclusive feature eliminates all possibility of the washer or spring binding on the stem and raising the valves.

Also note that there are no hands holding the tool, thus allowing operator free use of both hands.

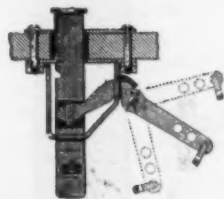


PARALLEL JAW K-D VALVE SPRING LIFTER

The K-D "Universal" fits practically any make of car. Complete with extra set of jaws List \$2.10

The Quickest and Easiest Way to Remove and Replace Valves

K-D No. 100 Cut-Out Pedal



This Pedal meets all requirements for opening Motor Testing Valves, Cut-Outs, Exhaust Whistles and Heater Valves. Will operate any make valve in any direction whether push or pull action is desired and with variable lengths of stroke. Adjustment of stroke quickly and simply made. Will operate from toe board or heel board to the convenience of operator.

Write for descriptive circular.

List \$1.00

The K-D is the one Valve-Spring lifter that replaces valves as easily as it removes them. Furthermore, they do the work more quickly.

Get these exclusive K-D features

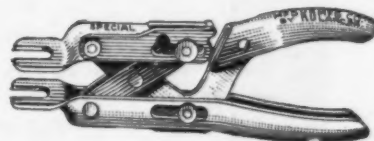
1. Jaws Remain Parallel throughout the entire lift, eliminating all possibility of the washer or spring binding on the stem either in removing or replacing the valve.
2. Extra Jaws, instantly interchangeable, make the tool adaptable to practically all sizes and types of motors.
3. Locking Device will stay locked in eleven different positions and will hold lifter in place when the spring is raised, thus allowing operator free use of both hands.
4. "Parkerized" against rusting and made entirely of pressed steel. Practically indestructible. Guaranteed against defective workmanship and material.

If your regular jobber cannot supply you, write us for description and discounts, and tell us who your jobber is.

Jobbers: If you are not a K-D Jobber you are overlooking a real opportunity. Write to us NOW.

The K-D Manufacturing Co.
Lancaster, Pa.

K-D Special Lifter for Fords and other small cars



All the advantages of the "Universal," with the exception of the removable jaws. Enables you to remove all valves from Ford motor without removing carburetor and manifold List \$1.10

USE THIS COUPON

K-D Mfg. Co.,
Lancaster, Pa.

Send me description and discounts on K-D Specialties.

Name.....

Address.....

My Jobber Is.....

The Presto Smile



Why wear yourself out? 63 muscles are used in Frowning. 13 muscles are used in Smiling. Use a Presto Electric Dash Cigar Lighter and smile! smile!!!

Trying to light a cigar while you're driving, with only a box of matches for assistance, uses every one of those 63 muscles. Why not give fifty of 'em a rest? The Presto Cigar Lighter puts a glow on your cigar or cigarette, over the entire end with neatness and dispatch, regardless of wind or speed.

The Presto Electric Dash Cigar Lighter

mounts conveniently on the dash. Pull the lighter out of the socket—presto! The current's on. Plenty of cord to reach everyone in the car. Replace it and the current automatically shuts off. Made for 6 and 12 volt cars.

It is just what every car owner wants. Your opportunity to make big sales and get repeat orders. A quick seller. No. 260 retails only \$6.00. Patented.

Four out of five car owners smoke. Over 7 million prospects. Why not sell an accessory that appeals to the convenience and comfort of every smoker?

Write for complete information and catalog No. 21 which includes entire line of over 100 Presto Motor necessities.

The new Broad-surfaced Tip puts a glow over the entire end of a cigar or cigarette—even covers the end of a cigar stub. Heating element made of extra heavy wire. *Strong and durable*.—made for all cars, 6 to 12 volts.



No. 260 Retails Only **\$6.00**

Patd. Tip.



Actual Size

We manufacture over 100 Presto quick-selling motor necessities.

METAL SPECIALTIES MFG. CO.
338-352 N. KEDZIE AVE. CHICAGO, ILL.



If Terminals Stick Give 'Em the Bird

We consider it the most practical terminal puller. You will, too, after using it once. It brings any terminal off clean, with one motion. No pliers, screwdriver, hammer, torch or other tools necessary. You don't have to loosen terminal bolts. Packed in individual cartons. List price \$4.50.

*Standard Discounts
To Repair Shops
and Battery Service
Stations*

Bird Manufacturing Co.
Marshalltown, Iowa.
Thurston-Palmer Company
4750 Sheridan Road,
Chicago, Ill.

These Jobbers Sell "Bird"

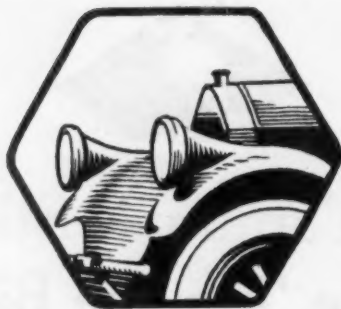
Herring Motor Co.,
Des Moines, Iowa.
Hippee-States Co.,
Des Moines, Iowa.
U. S. Rubber Co.,
Des Moines, Iowa.
R. F. & W. B. Fitch Co.,
Oskaloosa, Iowa.
Sieg Co., Davenport, Iowa
Kelley-How-Thomson Co.,
Duluth, Minnesota.
Kelly-Duluth Co.,
Duluth, Minnesota.
Reinhard Bros. Co.,
Minneapolis, Minn.
Williams Hardware Co.,
Minneapolis, Minn.
Western Motor Supply Co.,
Minneapolis, Minn.
Hans Johnson,
Dallas, Texas.
Nash Hardware Co.,
Fort Worth, Texas.
Southern Equipment Co.,
San Antonio, Texas.
McCauley-Ward Motor
Supply Co., Waco, Texas.
Miller Co., Inc.,
Waco, Texas.
Ohio Rubber Co.,
Cincinnati, Ohio.
I. J. Cooper Rubber Co.,
Cincinnati, Ohio.
Pennsylvania Rubber & Sup-
ply Co., Cleveland, Ohio.
Chicago Automobile Supply
House, Chicago, Ill.
Clark-Smith Hardware Co.,
Peoria, Ill.
Cummings & Emerson,
Peoria, Ill.
National E. & A. Supply Co.,
Peoria, Ill.

Flexible Cleaners Terminal Pullers Valve Spring Compressors

Southern Motor Supply Co.,
Oklahoma City, Okla.
Crow-Burlingame Co.,
Little Rock, Ark.
Voss-Hutton Mfg. Co.,
Little Rock, Ark.
O. D. Tucker IV & Co.,
Little Rock, Ark.
Benton-Bailey Co.,
Richmond, Virginia.
Hines Motor Supply Co.,
Billings, Mont.
Cumings Bros.,
Flint, Michigan.
Edwards & Chamberlain
Hardware Co.,
Kalamazoo, Mich.
Front Market Motor Supply
Co., Harrisburg, Pa.
Orr Iron Co.,
Evansville, Ind.
Auto Supply Co.,
Hutchinson, Kansas.
Canada
Motor Car Supply Co. of
Canada, Ltd.,
Calgary.
James Cowan Co., Ltd.
London.
Bowman Bros., Ltd.,
Regina.
Bowman Bros., Ltd.,
Saskatoon.
Canadian Fairbanks-Morse
Co., Ltd., St. John.
Independent Electric Co.,
Ltd., Regina.

Europe

E. B. Moller Auto Supply Co.,
Copenhagen, Denmark.



PIERCE

One of the notable attributes of the Pierce-Arrow is its ability to retain its youth almost indefinitely. Season after season, the mechanism remains quiet and capable. Year after year, this car resists even the outward appearance of deterioration. Qualities of permanence are so carefully incorporated in every detail of chassis and of body that, from the standpoint of performance, it is often difficult to distinguish the older Pierce-Arrows from the new.

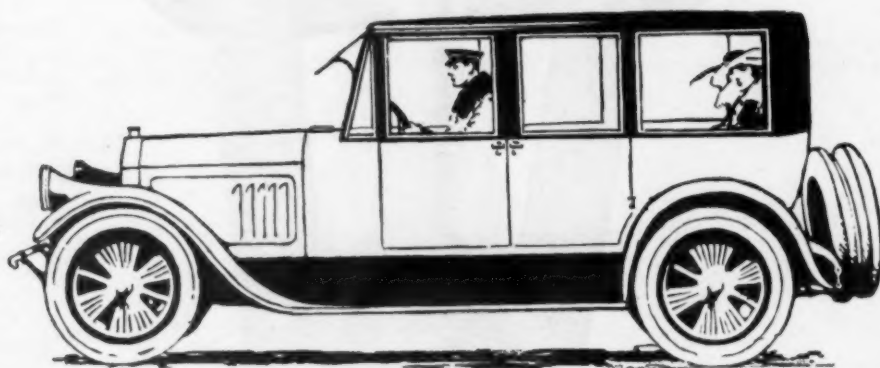
Appreciation of the Pierce-Arrow is not confined strictly to large cities. There is a constantly growing demand for this car in the smaller communities, as well. If there is no Pierce-Arrow representative near you, write to us for details of this valuable franchise.

Closed Cars \$7000

Open Cars \$5250

At Buffalo—War tax additional

THE PIERCE-ARROW MOTOR CAR COMPAY, Buffalo, New York



ARROW

EVERY MOTORIST KNOWS THIS LINE

The Kokomo Electric line has been on the market for twenty years. Every motorist knows the line for the correctness of design, the staunchness of construction and the all-around dependableness of every item. Dealers everywhere find Kokomo Electric Company products their best and steadiest sellers.

The Kingston Heater



The Kingston Heater is the fastest selling device in its class in the country today. It has received the warmest approval, and dealers are swamped with business. It is not a make-shift, but a staunchly built heating device, an ornament as well as a winter necessity. Made in the following models, boxed, ready to install:

Ford,	\$3.75	Overland,	\$5.00
Dodge,	5.00	Chevrolet,	5.00

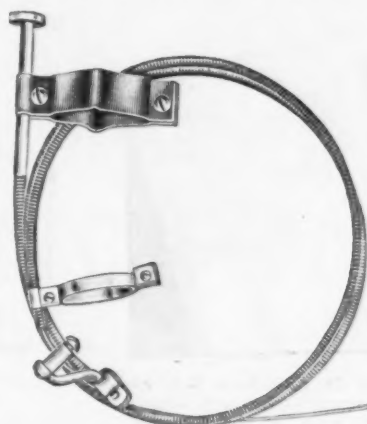
The Kingston Battery Ignition System for Fords

A high-class ignition system similar to that used on the highest priced cars. Completely wipes out all commutator trouble resultant from dirty contacts and uneven wear, and obviates annoyance from loose oil-soaked wires, or wires with raveled insulation. Strictly high-class, fully guaranteed, easily installed.

Price, complete, \$20.00



The Handy Carburetor Adjuster



Another great cool weather seller. With pull button installed on steering column, just under the steering wheel, a full one-third turn of the carburetor needle may be made. Easily installed, nothing to get out of order, and will actually save its cost in gasoline in a short time. Makes cold weather starting and driving easy.

Price Complete, \$1.50

KOKOMO ELECTRIC COMPANY, Kokomo, Ind.

NEW YORK: 245 W. 55th St.

DETROIT: 4610 Woodward Ave.

BRANCHES:

BOSTON: 15 Jersey St.

CHICAGO: 1430 Michigan Ave.

SAN FRANCISCO: 32 Van Ness Ave.

KINGSTON

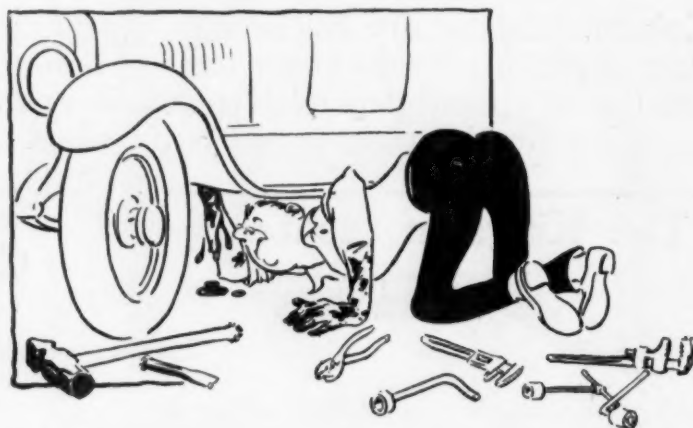
Why He "Cussed" on Sunday



This 24 page book lists all important service and adjustment nuts for the following makes of cars and tells which Snap-On units make a complete wrench set for each:

Ford	Jewett
Buick	Maxwell
Cadillac	Nash
Chandler	Oakland
Chevrolet	Oldsmobile
Dodge	Overland
Essex	Paige
Hupmobile	Reo
Hudson	Studebaker
	(Light Six)

Get Your Copy—Sell
"Sets" Instead of Single
Wrenches



"GASOLINE ALLEY"—on a Sunday morning. He's cussed an hour, maybe—trying to reach an orphan nut with everything from a "misfit" wrench to a hammer and a cold chisel.

—and next day he comes into **your** store—looking for a **real wrench** that will reach, hang on and fit the nut that made him swear.

Of course you've got it! You open the handy Snap-On book to the car he drives and in a jiffy pick the units and build the wrench he needs before his very eyes. A beautiful demonstration with a real sales wallop to it!

—but wait a minute. You're under that car owner's hide, now—ready for the big stuff. **Now show him the complete Snap-On selection for his car!** Hammer home its completeness—compactness—low price. He'll get the idea in a hurry—and you're ready to shake hands with a wrench sale that runs into real money.

Write for the complete Snap-On proposition—the greatest sales opportunity on wrenches ever offered in the industry's history

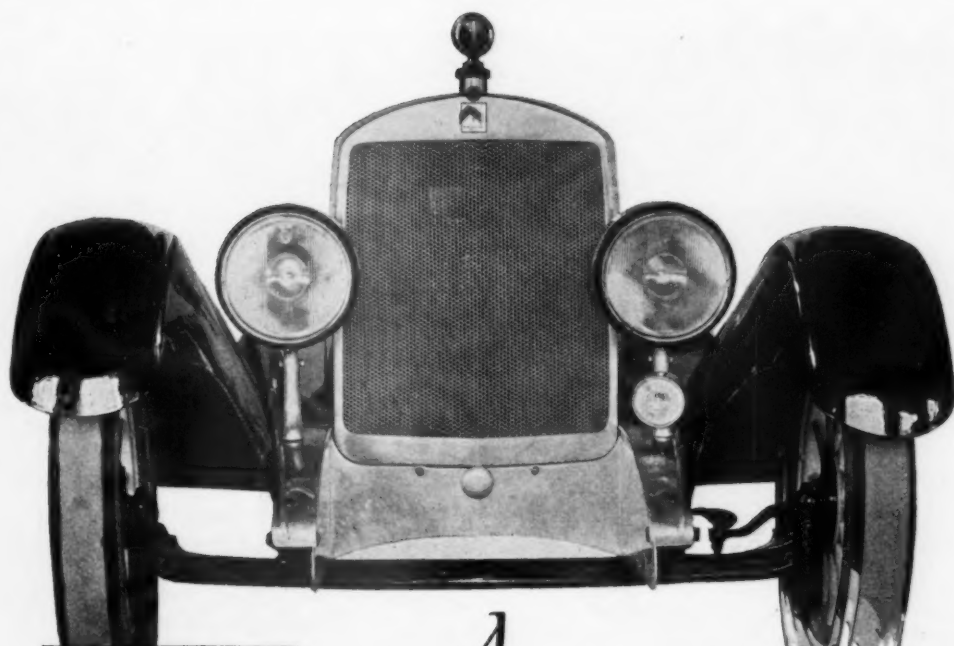
MOTOR TOOL SPECIALTY CO., Distrs.
Dept. A-15, 14 E. Jackson Blvd., Chicago, Ill.

SNAP-ON WRENCH CO., Mfgs.
Milwaukee, Wis.



Snap-on

INTERCHANGEABLE
Socket Wrenches



Announcing the TARKINGTON MOTOR CAR

A successful and large organization of fine machinists and drop forgers, long making precision machine tools and forgings for the best automotive manufacturers, have developed a new motor car. They have set forth in tangible form their principles and ideas of simplicity, lightness and sturdiness, ever bearing in mind at each point of design that such a car must be easily, quickly and cheaply serviced, and yet meet the first demands of speed, power, economy and ease of riding.

This car is built primarily for the man who can own a good car but who loves to drive and care for it himself.

Thus the marketing of this car will fall to those dealers who will be attracted naturally by the makeup of the car itself and who reach the logical class of buyers. There is now an attractive market

for cars of this class with a heavy replacement every year. Sixty per cent of these can be sold in towns under 25,000 population. The advanced closed car policy of this company will enable the dealer to widen his natural market by reaching into other classes.

The men of this organization earnestly wish and expect their dealer force to be built upon the same principles built into this car and upon which their own successes have been founded.

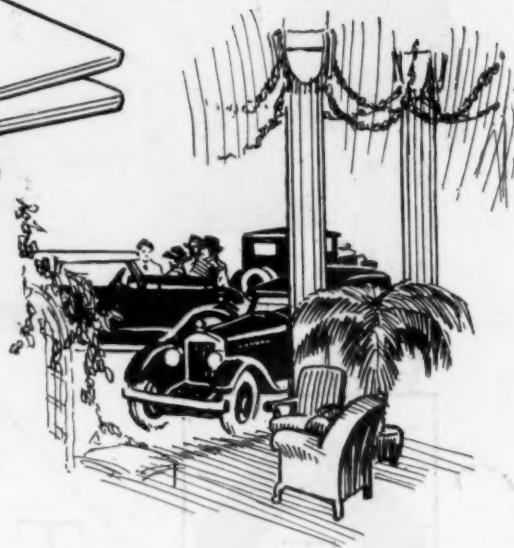
Therefore, though you should be greatly pleased with a careful and minute inspection of the car itself, you will be even more interested in the dealer agreement which has been written from the standpoint of direct, permanent connection, liberal compensation, and close co-operation in each dealer's personal territory.

At your request photographs and specifications will be mailed and all questions fully answered.

TARKINGTON MOTOR CAR COMPANY

ROCKFORD, ILLINOIS





MAKE a note today to call at the *DALTON & BALCH* exhibit at the Chicago Show and get one of their "Timing Dope" Charts.

We will be located in space 85 in the Coliseum Gallery at Chicago, directly opposite the main entrance.

These wall charts contain information compiled for repair and service work on motor timing and other valuable shop information—information that will make these jobs easier to do—quicker—and productive of better profits.

You cannot afford to be without one or more of these charts, or miss the chance to inspect the line of *D & B* Silent Timing Gears that will be shown. These gears have a country-wide reputation for Accuracy—Durability—Silence—Quality that has made them the preferred gears for replacements. Over a quarter of a million sets are in use.

Be sure and make a note—now—to call for one of these charts.

At the Show

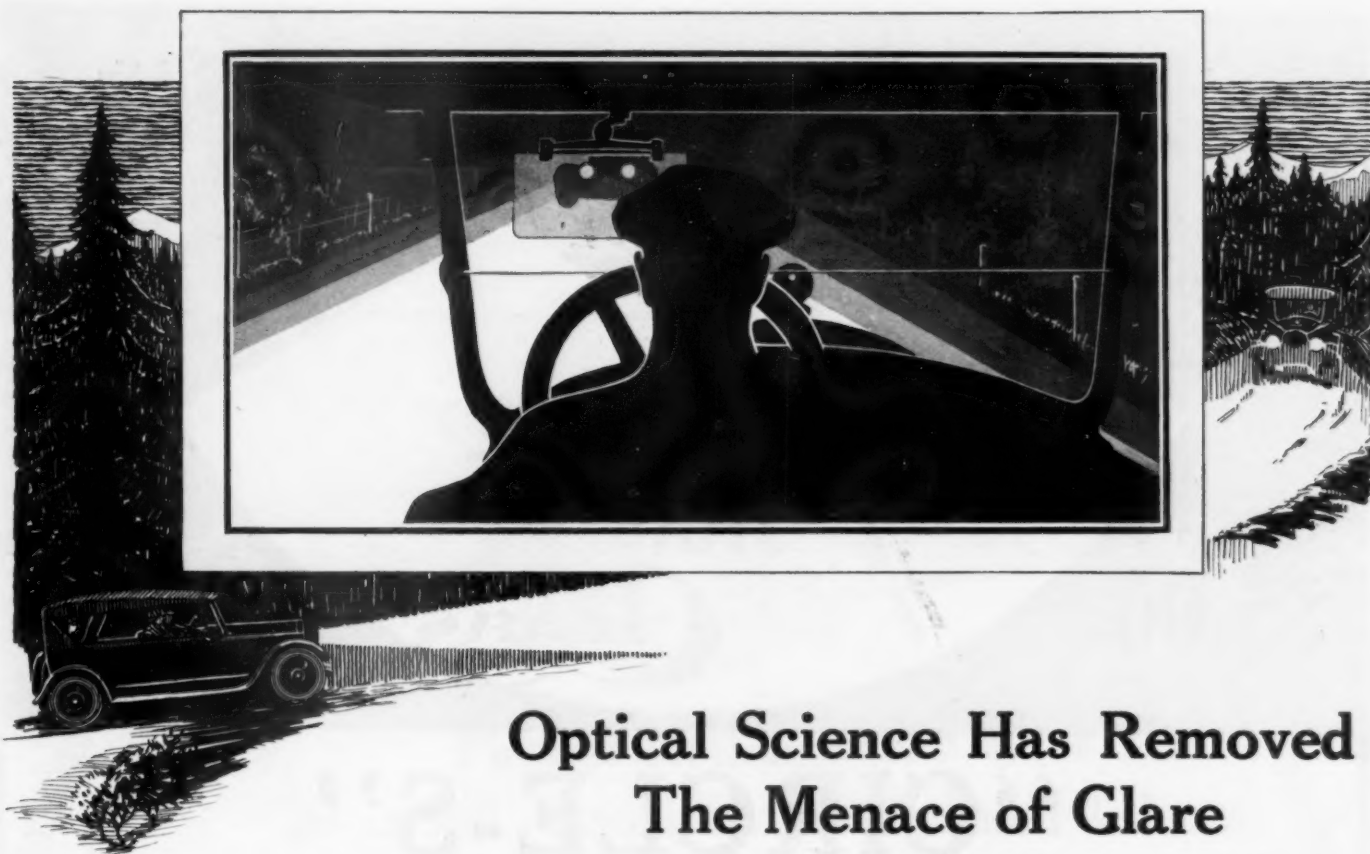
We will be in space 85, Coliseum Gallery at Chicago. Come in and see us!



2333 MICHIGAN BLVD.

CHICAGO, ILLINOIS

Member of the American Gear Manufacturers' Association

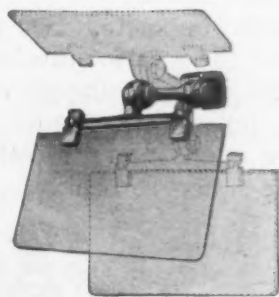


Optical Science Has Removed The Menace of Glare

With an **OPTOSHIELD** on the windshield a driver is not blinded by the brightest headlights of an oncoming car and experiences no discomfort from road glare, sun glare or snow glare. The **OPTOSHIELD** turns the brightest glare into ordinary daylight. The driver's vision is not impaired—he can see through it perfectly. Made of sapphire-blue scientifically prepared optical glass with a heavily nickel plated bracket. It is one of the most useful inventions a car owner can buy and is a handsome, distinctive addition to a car's equipment.

A simple demonstration right in your store will rarely fail to make a sale. Hold an **OPTOSHIELD** in front of the brightest light in your place and let the customer see how it softens down the glare yet does not obstruct the vision.

Two models—for open and closed cars—fit all makes of passenger cars. You need not carry a large stock. See your jobber and if he hasn't yet stocked the **OPTOSHIELD**, write to us and mention his name. Descriptive literature will be sent you on request.



Note how easily the position of the **OPTOSHIELD** is adjusted. The **OPTOSHIELD** can be kept in a raised position until a car approaches, when it can be lowered instantly. Or if there is glare from the road, sun or snow the driver can keep the **OPTOSHIELD** down and see through it perfectly.

Price

\$3.50

Attached Instantly
by Anyone

DETRO SALES SERVICE COMPANY
1647 Penobscot Bldg., Detroit

Sales Division of Grand Haven Brass Foundry

The
Optoshield
TRADE MARK

Adjust the Pressure of The Squeegee Against the Glass Here. Use Inside Nut to Lock the Squeegee Out of Vision



A Cleaner That Cleans

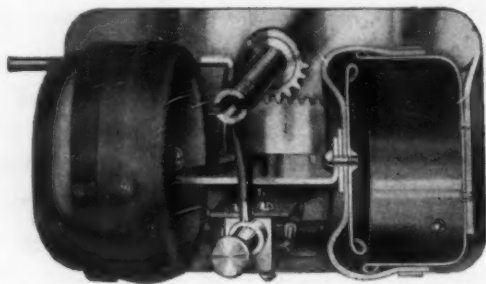
Put in Operation and Stopped Here

Price

\$5.00

“CIRCLE-S” Automatic Windshield Cleaner

The “Circle S” Automatic Windshield Cleaner is simplicity itself. No pistons, piston packing, connecting rods, cylinders or cams. Just two vacuum cups and valves for controlling them. The rest is an ordinary rack and pinion.



Examine the illustration opposite. See the foolproof sturdiness of the interior mechanism. Suction from the intake collapses one vacuum cup and pulls the Squeegee one way. The valve opens and the other vacuum cup sucks the squeegee back.

No Strain on Squeegee

Inside adjustment of squeegee permits release of pressure against glass when not in use, thereby avoiding a permanent “set” or bending out of shape of the cleaner rubber.

Inside Hand Operation

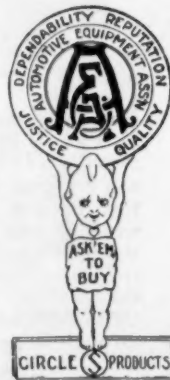
Should the squeegee become frozen to the glass or become imbedded in snow or sleet while standing, it can be started by hand from inside the car.

Powerful Operation

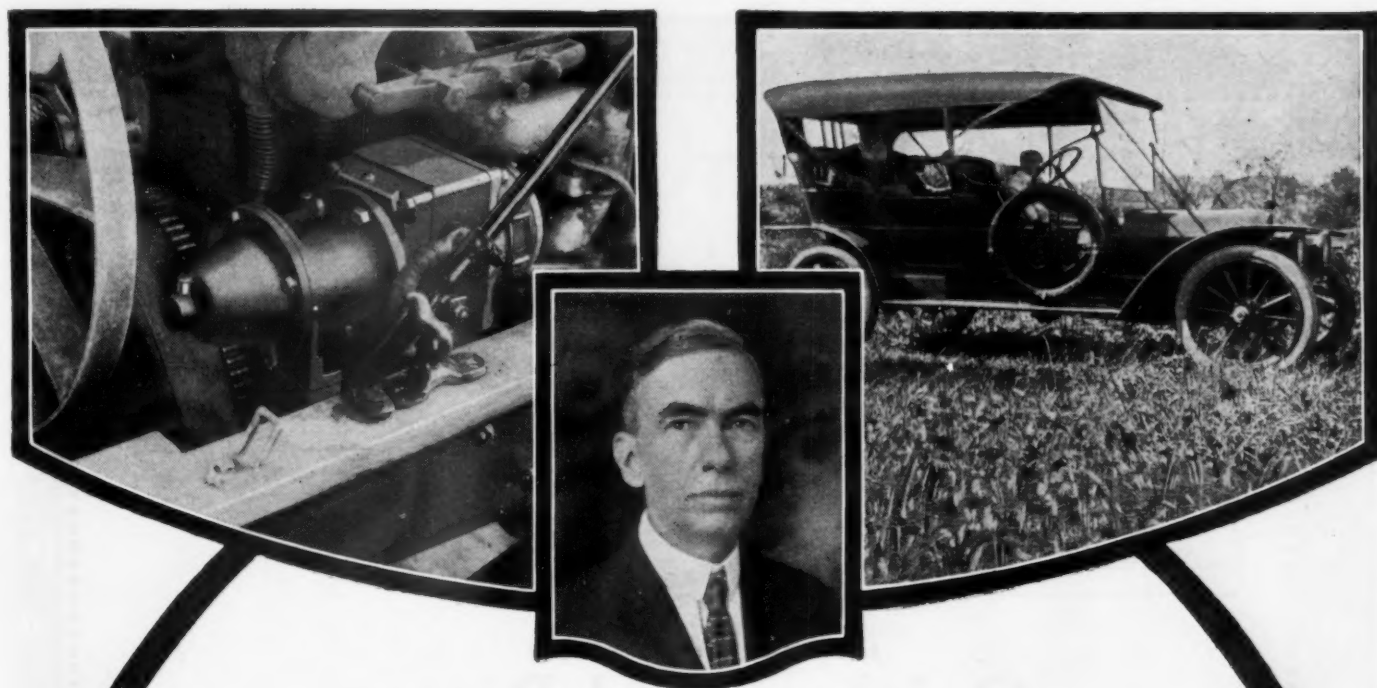
The absence of friction producing parts in the Circle “S” gives you full power of the vacuum thereby permitting a tight adjustment of the rubber against the glass.

Long Life

A minimum number of working parts and the entire absence of packing assure long life and uninterrupted service.



Dealers—Write us today for Sales Possibilities
F. W. STEWART MFG. CORP., 349 W. Austin Ave., Chicago, Ill.



Pioneer Builders of Electrical Automotive Equipment

Westinghouse Automotive Engineers have long been regarded as pioneers in the development of Electric Equipment for Automotive vehicles.

Mr. Frank Conrad, one of Westinghouse's foremost engineers, developed and constructed the first successful automatic pinion shift device for starting motors, of the type now in general use, in 1913.

This device was installed on Mr. Conrad's Stevens-Duryea car in April of that year and operated for two years

without any special attention.

And prior to this application Westinghouse Automotive Engineers designed and applied successfully other electrical devices which are essential to motor car operation today.

The history of the development of this and other types of the automatic pinion shift device serves only as one example among the many instances where Westinghouse Engineers have proved themselves men of vision as well as practical ability.



WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

Automotive Equipment Department

Sales and Service Headquarters: 82 Worthington St., Springfield, Mass.

Westinghouse

STARTING, LIGHTING & IGNITION



Look for the Yellow Band

Every armature rewound by us carries this band on which is printed our positive guarantee that the armature will give the same service as a new one.

Quicker and Better Armature Service

Our armature service has grown to such an extent during the past few years that it now occupies a separate division of our business. The volume of work handled has repeatedly doubled and redoubled until today our stocks of rewound armatures reach well up into the thousands.

Prompt service, accurate and guaranteed work, and the lowest prices consistent with quality have been the reasons for this remarkable growth. During 1923 we will do our level best not only to maintain our excellent service but to improve upon it if at all possible.

To those not familiar with our high type of service we suggest a trial order. Send us defective armatures for any make of car and rewound ones, guaranteed to give the same service as new ones, will be shipped from our exchange stocks **the same day the order is received.** Thousands of dealers and repairmen are now on our list of steady, satisfied customers.

Send in the defective armatures you have or write for a complete price list.

U. S. AUTO SUPPLY COMPANY

ARMATURE SERVICE DIVISION

• 3845 S. Wabash Ave.

Chicago



PRICES

Ford Armature rewound—	Any two unit generator armature rewound—
\$2.00	\$5.00

The achievement of an amalgamation
with assets of 20 millions of dollars
and plants in eight states

\$795

FACTORY

NATIONAL SIX THIRTY-ONE

One of a family of "Sixes" that took the New York Show by storm. A startling new value, the news of which was featured in telegraphic dispatches the country over.

At CHICAGO: Exhibits at the Armory and at the Congress Hotel; Headquarters at Congress Hotel.

NATIONAL MOTORS CORPORATION

Chicago

St. Louis

Boston

Indianapolis

Louisville

Dayton

Lockport, N. Y.

Jackson, Mich.

Saginaw, Mich.

SALES DIVISION HEADQUARTERS, ST. LOUIS, U. S. A.

A Complete Line of Fine Cars with a remarkable Leader

Shown at the New York Show—for the first time anywhere—the new line of National Sixes covers every car need or desire in a complete price range. It includes the Show's most outstanding value—a six-cylinder car, with 112-inch wheelbase, to sell for \$795—a price which will lessen sales resistance to a negligible quantity.

The new line enters the field at a time when there is a universal demand for a lower-priced light six, which can also show consistent performance. In the Six Thirty One it attracts the largest possible market with a price which is even beyond the competition of the present "Fours."

The crowds at the Show were particularly impressed with the custom designing which is so apparent in every National model—the work of one of the greatest of American custom body designers, H. F. Holbrook. Under one family name, these new Nationals, ranging from \$795 for the Six Thirty One Phaeton, and \$1485 for the Six Fifty One, to \$2485 for the 7-passenger Six Seventy One have given the car-buying public new standards of motor car value.

After the enthusiasm of the Shows is over, the trade will be as equally interested in the engineering aspects of National car building as they have been surprised at the quality of design, coach-work and upholstery. Prices, too, will appear as greater values still, when dealers begin to realize the rich experience in engineering represented in the new National Sixes.

NATIONAL

National cars are made and serviced by the National Motors Corporation, a consolidation with assets of over twenty millions of dollars and plants in eight states. Combining, as the new company does, twenty years of fine car building and engineering experience with every type of car under every conceivable variety of American road condition, the result is an important step ahead for the industry as a whole—and especially for car dealers who are quick to sense the possibilities which the new line offers them.

SIX THIRTY ONE

Six-cylinder, unit power plant; 112-inch wheelbase; full semi-elliptic springs; standard selective-type transmission with disc clutch; 31x4 cord tires; body by H. F. Holbrook with complete equipment.

SIX FIFTY ONE

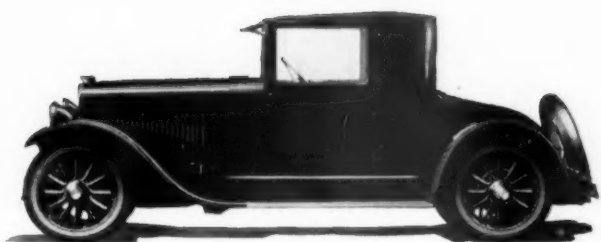
Continental Red Seal six-cylinder unit power plant; 121-inch wheelbase; Timken bearings in all four wheels; 32x4 cord tires; body by H. F. Holbrook with complete equipment.

SIX SEVENTY ONE

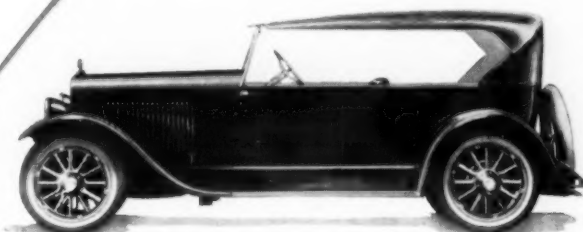
National six-cylinder, 71-hp. high-efficiency unit power plant; 130-inch wheelbase; full floating rear axle; 32x4½ cord tires; body by H. F. Holbrook with complete equipment.



Six Seventy One Close-coupled Sedan, \$3285

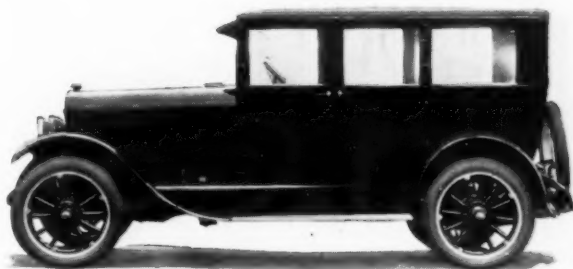


Six Fifty One Coupe, \$1785

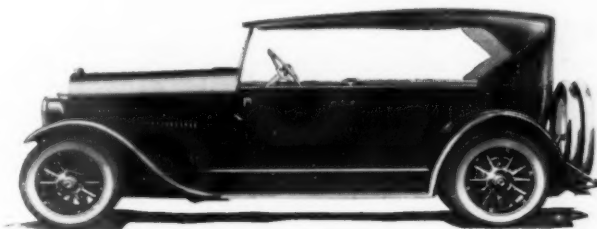


Six Fifty One Phaeton, \$1485

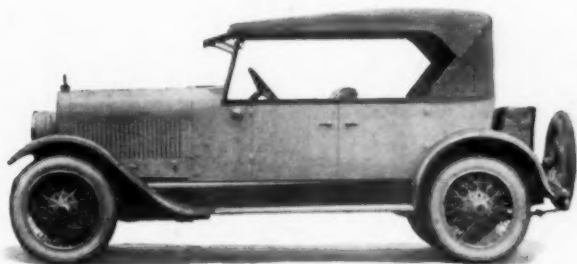
SIXES



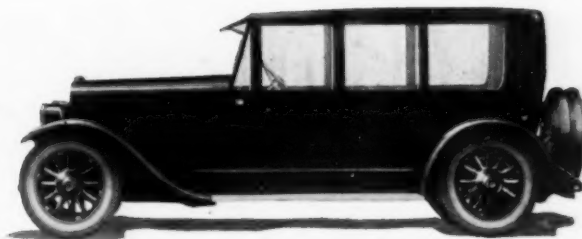
Six Fifty One Coach, \$1885



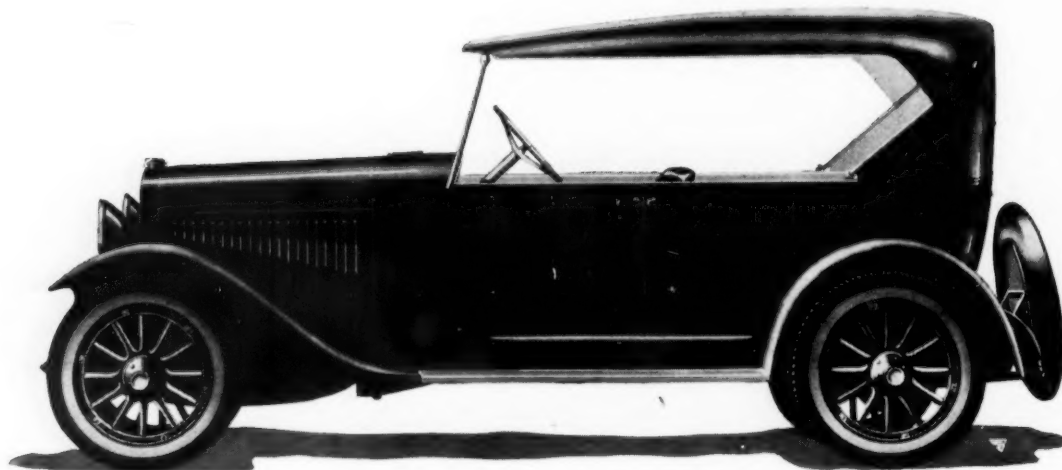
Six Seventy One Phaeton, \$2485



Six Seventy One Sport Phaeton, \$2485



Six Seventy One Sedan, \$3285



NATIONAL

SIX THIRTY-ONE

\$795
FACTORY

See the new Sixes at the Chicago Show. If you haven't been able to get to either the New York or Chicago Shows, don't fail to get in touch with our nearest office. We can arrange to demonstrate the new line in some manner. In any event, don't let the big-selling season come along without investigating the possibilities in the new National line. Nothing of comparable value has been produced in years. It will startle the car-buying public and your competition just as it did in New York. Why not write us *at once*?

NATIONAL MOTORS CORPORATION

Chicago
St. Louis
Boston

Indianapolis
Louisville
Dayton

Lockport, N. Y.
Jackson, Mich.
Saginaw, Mich.

SALES DIVISION HEADQUARTERS, ST. LOUIS, U. S. A.

At CHICAGO:

Exhibits at the Armory and at the Congress Hotel; Headquarters at Congress Hotel.



New Departure Ball Bearings

THERE is convincing argument in the fact that 95 per cent of the motor cars made in America depend upon ball bearings for efficiencies and economies that are so essential to successful marketing in a highly competitive field.

New Departure ball bearings are a highly qualitative development of the only type of anti-friction bearings in which frictional losses do not materially increase under heavy end thrust and radial load, whether the speed be high or low.

New Departures carry the maximum load at the lowest cost per mile, because of absence of frictional loss and freedom from wear, adjustment or replacement.

THE NEW DEPARTURE MANUFACTURING COMPANY
BRISTOL, CONN.

Detroit

Chicago

Cold Rolled Electro-Galvanized

The trade mark
is on every car-
ton and on
every clamp.

Look for it.



The Adjustable Clamp That Fits Any Hose Of Any Size

Packed in lots
of 50 to a
carton.

Order by the
box or by the
hundred.

All hose clamps are not alike. They differ in material and manner of construction.

"Size-adaptability"—ease of installation—leak preventing service—are matters of specialized manufacturing.

The Universal Hose Clamp is made of cold rolled steel from wire—not strap. Its edges are therefore smooth—it cannot cut or injure the hose. This point is most important. Further—the clamps are "electro" not "heat" galvanized.

Another exclusive feature of the Universal Hose Clamp is the patented "bead" or ridge. It is located on the "bolt and nut" end of the strip. The pressure of the nut bears the overlapping metal firmly against this ridge. The pressure is in-

creased where most needed. The result is a leak-proof connection.

The automotive field was quick to recognize the exceptional advantages of the Universal Hose Clamp. Its convenience and economy soon resulted in its becoming the most heavily used Hose Clamp in the automotive industry. The Universal Adjustable Hose Clamp is made in two sizes only—"Senior" from 1 to 3 inches. "Junior" from 1/4 to 1 1/2 inches. Both sizes may be used in series to accommodate any diameter.

JUNIOR HOSE CLAMPS
Take from 1/4 inch to 1 1/2 inch sizes. Particularly Adapted for Garden Hose. A fast Selling Hardware Accessory.

Write for Details.

Dealers,
Repairmen,
Servicemen,
Specify
Universal
Hose Clamps.

Your Jobber carries Uni-
versal Hose
Clamps in
Stock. Demand
that your next
order is filled
with Universal
Clamps—they give 100% ser-
vice, pay good profits and sell
fast. Order from your Jobber
or Write direct.

UNIVERSAL INDUSTRIAL CORP., HACKENSACK, NEW JERSEY
SOLE MANUFACTURERS

Department of Sales

CHICAGO, ILL.
F. C. West Corp.
616 S. Michigan Ave.

PHILADELPHIA, PA.
T. Scott Eavenson,
1533 Cherry St.

DALLAS, TEXAS
Knight-Smith Co.
2303 Main St.

BOSTON, MASS.
Burton-Rogers Co., 755 Boylston Street



UNIVERSAL HOSE CLAMP

Adjustable to fit any hose of any size



WHEN you equip your customer's car with a Titanic spring he puts the center breakage bugaboo out of his mind. Titanic Springs are built strongest where the strain is greatest. A sturdy, springy arch takes the place of weakening center bolt holes or nibs. That's why Titanics alone are guaranteed forever against center breakage.

Titanics are as comfortable to ride on as they are durable in service. Make your "broken spring" prospects satisfied customers by giving them a guarantee forever against center breakage with each Titanic Spring. See Chilton's or write to us direct for prices and information.

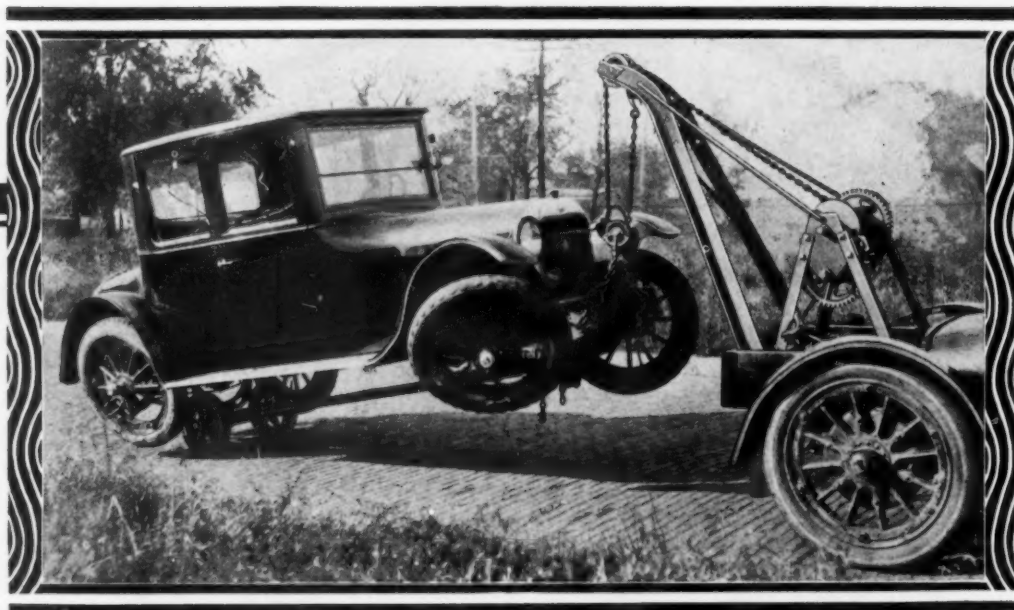
TITANIC

Trade Mark Reg.

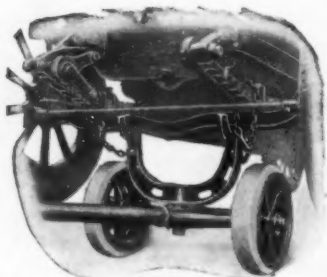


SPRINGS

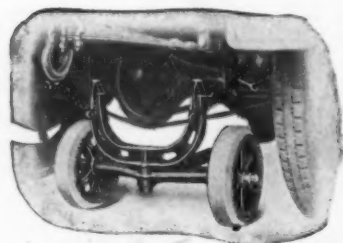
TUTHILL SPRING COMPANY, Established 1880, 760 Polk Street, Chicago



You can handle any wreck with this **WEAVER** combination



Easily applied to front axle to which it can be securely clamped.



Yoke straddles differential when applied to rear axle.

WITH a Weaver Auto Ambulance, Model C, and a Weaver Auto Crane on your service car, you know you are equipped to handle any wreck, quickly and easily. It's a real money-maker—this combination—not only from the standpoint of the direct fees you receive from this work, but also from the far more important fact that it will constantly bring in repair jobs that will keep your repair shop running to capacity. And efficient service of this sort will prove splendid advertising that will win many new friends for your shop.

Weaver Auto Ambulance, Model C

Note how strong and durable, and yet how simple in design, our new Ambulance is. The wide cast steel yoke provides a two point support for the car axle. This and the extremely wide tread (28 inches between centers of tires) support the car rigidly in position and prevent its tipping on the roughest roads. Easily and quickly applied to either front or rear axle, as illustrated. With or without rubber tires.

Special folder describing Model C Ambulance will be mailed you on request.

WEAVER MFG. CO.

Springfield, Illinois, U. S. A.

Weaver Canadian Co., Ltd.
Chatham, Ontario



"The Best Equipped Shop gets the Business"





TRINDL PISTON PINS

TRINDL Quality cannot be bettered, because from a quality view point it represents the acme of perfection.

Solid bar stock of S.A.E. specifications comprises the raw materials from which **TRINDL** Piston Pins are made. Machining, grinding, polishing—in fact every machine operation—is done on the latest type of production machinery, by workmen expert in this work. Each step of manufacture is checked and inspected. The heat-treating process—one of the important steps in piston pin manufacture—is done under such perfect and scientific methods that nothing but superior results are possible.

TRINDL final inspection is most rigid. When **TRINDL** Piston Pins leave our plant they are as perfect as it is possible to make pins. This is your protection—a guarantee of accuracy and a perfect product.

TRINDL SERVICE

TRINDL Service is a byword in a majority of shops, because it means prompt shipment when your order is received. Standard and oversize pins and valves are shipped immediately upon receipt of order. Specials leave our shop within 24 hours. No delay on hurry up or special jobs in your shop—we realize the importance of speed. Our stock includes pins and valves of every size—for every motor—ready for shipment on a moment's notice.

TRINDL Quality and TRINDL Service Never Fail

THE TRINDL CO.

2917 Wabash Avenue

Chicago, Ill.

Milwaukee Branch: 615 Wells Street

Have You These Books?

You Need Them

Send for the book mentioned above, and ask for the other two—one is a straight stock and size list with specifications of all piston pins made. The other is the **Trindl Super Warp Proof Valve** list.

These valves, by the way, are making shopmen open their eyes. They are of a special alloy, made by a special process and stand up much longer than others that cost more. Ask us for full information on them.

3

CLAIMS WE ARE PREPARED TO PROVE

1. Quality that cannot be bettered.
2. Service that cannot be improved.
3. Largest stocks of widest range.

TRINDL SUPER WARP PROOF VALVES

The quality of **TRINDL** Super Warp Proof Valves, like in all **TRINDL** products, represents a distinct step forward in valve construction.

The two most common causes of valve trouble—friction and heat—are overcome in the use of special alloy steel in both heads and stems. The non-corrosive steel in the heads withstands the highest heat successfully; the steel in the stems is proof against the hardest wear. **Trindl** Super Warp Proof Valves are made by a patented process, combining the advantages of other types while eliminating all the disadvantages found in them.

TRINDL Super Warp Proof Valves are manufactured from raw stock to finished product in our own shops. The regular **TRINDL** routine and careful supervision governs their progress from one stage to another. Therefore we can guarantee them as superior in every detail.



THE UNICO NEWS

Published by the UNICO MOTOR PRODUCTS CORP.

Vol. 1, No. 2

Thursday, Jan. 25, 1923

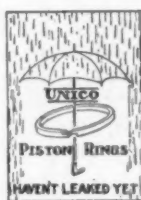
Price Three Minutes

UNICO DURABILITY SURPRISES TRADE

Pleased owners report great gas economy even after months of hard winter service

Users demand UNICO rings in later overhauls

FRIENDS OF BUYERS ALSO BUY



by the number of repeat orders continually given by satisfied users of UNICO rings and their friends.

The second overhaul is the real test of most replacement parts. The man who is having his car made roadable for the first time can be sold almost anything. The next year's performance depends pretty much on how sensitive a conscience the repairman has. The second overhaul comes after the owner has had a good two-year's education. If a part has made good in that time, he's for it. If it has failed, he's through.

The increasing number of UNICO rings sold for second installations does credit to the dealers who have regard for their reputation, and to the manufacturer's unremitting inspections.

UNICO INSPECTIONS RIGID

Smelting the iron, and its percentages of other minerals covers the first inspection. (A tenth of one per cent too much sulphur can cause a ring to snap like a match.) Rough castings are inspected for faults and bubbles. They must be inspected again after rough machining. They must be held to close tolerances in finishing.

The most careful inspection of all is that for roundness and concentricity. Every

ring is passed through a gauge ground to a perfect circle. If the smallest ray of a powerful light shows between ring and gauge, that ring is discarded.

Every day, keen-eyed men, with instruments of precision, correct the setting of tools, the wear of jigs, and the accuracy of gauges. Many ask how such a system can be maintained when UNICO rings cost so little. The system prevents costly mistakes. It protects the UNICO Corporation, the jobber and the repairman from complaints and make-goods.

UNIFORMITY PROMOTES SALES

The repairman who sells UNICO rings knows that this system has made UNICO rings exactly alike. His "luck" will be good. He will not find that many work perfectly while one faulty ring spoils the performance of all the others. He sells his customer a set of UNICO rings, knowing that he is giving more than the worth of the money. Many repairmen have sold UNICO rings, and have sold another set of oversized rings to that same man a year or two later.

Since UNICO rings are made in all sizes, only the one line need be carried. The UNICO Corporation carries 1,000,000 rings of all sizes for immediate shipment.

ADVERTISING BOOSTS JOBBERS RECEIPTS

National Campaign Broadens Wholesalers' Market

St. Louis, Jan. 25.—More rapid turnover, easier sales,

increased mail orders, and distribution are reported by jobbers taking advantage of the national advertising campaign of the UNICO Motor Products Corporation, of this city.

This campaign, using large space in publications reaching automotive dealers and repairmen, is unusual because it goes into more detail than is customary.

DOESN'T SHOUT: EXPLAINS

Instead of shouting the name of the ring, and describing it

in so few words as to impart little information, the UNICO Corporation's advertising goes carefully over the manufacture of UNICO rings. Each detail, and how it affects the dealer's sales for the better, is told in plain, straightforward speech.

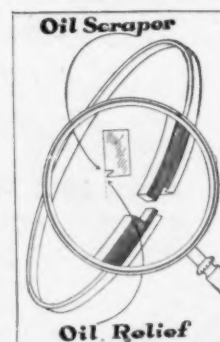
Since the whole story is told, the advertising produces immediate results. There is no wait for the story to "get across." Those jobbers who stocked UNICO rings are now reaping the benefits.

UNIC-OIL

Concentric
Individually
Cast

Efficient
and
Economical

List Price 50c



List Price 50c

QUICK-SEATING STEP-CUT



List Price 25c & 30c

Quality Best of All—All of Best Quality

Ask Your Jobber

UNICO MOTOR PRODUCTS CORP.

Kingshighway & St. Louis Ave. St. Louis, Mo., U.S.A.

ADVERTISEMENT



Smallest wiper on the market. 2 inches greatest dimension.

BERILL & CO.

The special wiper arm construction — a steel stamping — insuring perfect wiper action.

The special reinforced flexible shaft capable of driving $\frac{1}{8}$ inch drill through solid steel.

A Mechanically-Operated Windshield Wiper

—driven like a speedometer

At last—a MECHANICALLY operated windshield wiper. One that drives off the fan-belt or the propeller-shaft. POWERFUL enough to operate perfectly, even in the heavy sleet storms.

Has no connection with the intake manifold—cannot interfere with the suction of the motor. Doesn't slow down as the car-speed increases. The greater the engine-speed, the more rapid the wiping action.

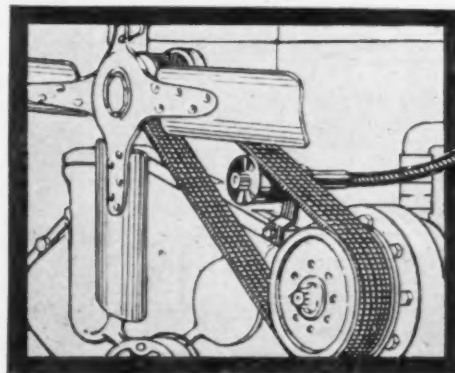
The CHALLENGE Windshield Wiper is operated like a speedometer, through a flexible shaft and three cut steel gears, packed in sufficient graphite grease to last for several seasons, operate the wiper arm, with incomparable POWER POSITIVELY and NOISELESSLY. A tiny knob within easy reach of the driver starts and stops it.

Smaller, neater—so small in fact that it is scarcely noticed either from outside or inside of car. A big improvement over larger, cumbersome, less reliable wipers.

The price is the most surprising feature of all — retail price \$6.

BERILL & CO., BUFFALO, N. Y.

The SALES OPPORTUNITY is unusual, as here, at last, is a wiper fit for a fine car. Sells on sight, regardless of how many types an owner may have experimented with. Write for our proposition.



The hollow driving pulley, containing enough lubricant for several seasons with simplicity of attachment.

\$6



Challenge

Windshield WIPER

DRIVEN LIKE A SPEEDOMETER

There's a particular Walden-Worcester Socket Wrench for each particular part of each particular car.

WALDEN-WORCESTER Service Selections of Socket Wrenches—

What are They?

WALDEN-WORCESTER Service Selections represent a series of wrenches selected from stock numbers and recommended for servicing over SIXTY CARS AND TRUCKS.

Many motor car manufacturers realizing the importance of efficient service have endorsed these selections and recommended them to their service stations.

They not only put wrench buying on a sound basis but insure the right wrench for every nut.

There's a Walden-Worcester Service and Owner's Selection for each of the cars and trucks listed at the bottom.

Ask your jobber about the Walden-Worcester method of selecting wrenches.

WALDEN-WORCESTER are the originators and patentees of wire handle all steel socket wrenches which have been successfully manufactured since 1906.



WALDEN-WORCESTER WRENCHES are designed and manufactured to meet the most exacting service conditions and are recognized everywhere as standard quality tools.

WALDEN - WORCESTER
Incorporated

**GENERAL OFFICES AND FACTORY
WORCESTER, MASS.**

There are service and owner selections of Walden-Worcester Socket Wrenches on the following:

CARS

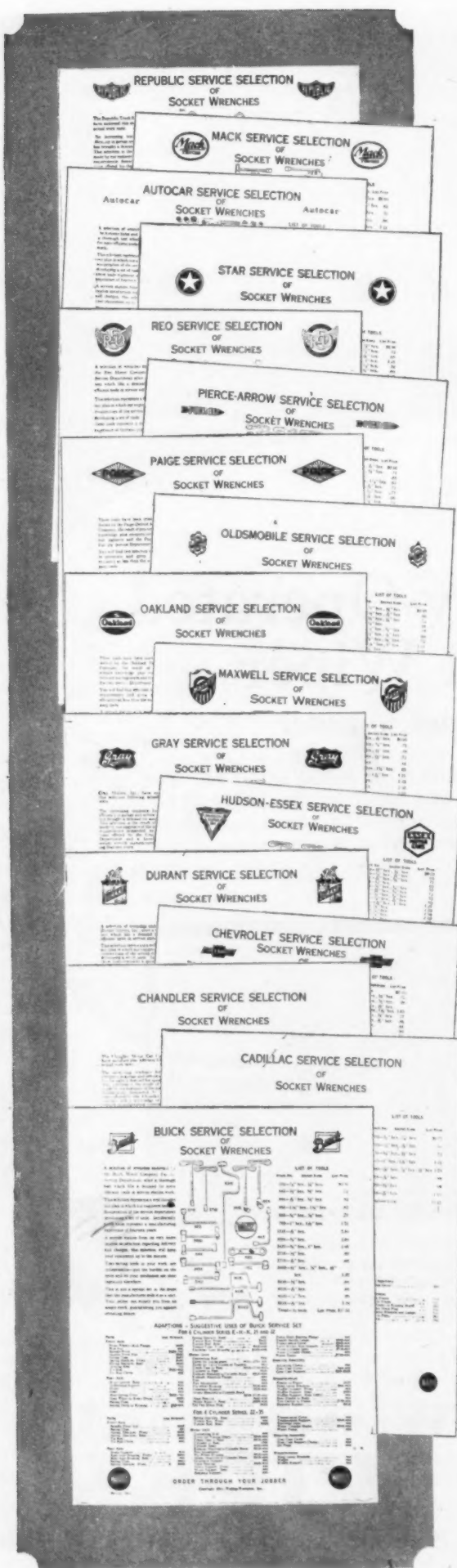
Buick
Cadillac
Chalmers
Chandler
Chevrolet
Cleveland
Cole
Columbia
Dodge
Dort
Dumont
Earl
Essex & Hudson
Ford
Franklin
Gardner

Grant
Gray
Haynes
Hudson & Essex
Hupmobile
Jewett & Paige
Jordan
Liberty
Lincoln
Marmion
Maxwell
Mitchell
Nash
Oakland
Oldsmobile

Overland
Packard
Paige & Jewett
Pierces
Pierce-Arrow
Reo
Rickenbacker
Scripps-Booth
Standard Eight
Star
Studebaker
Sutcliffe
Willis Ste. Claire
Willis-Knight
Winton

TRUCKS

Autocar
Commer
Federal
Ford
G. M. C.
International
Mack
Oldsmobile
Packard
Pierce-Arrow
Reo
Republic
Selden
Stewart
Vim
White

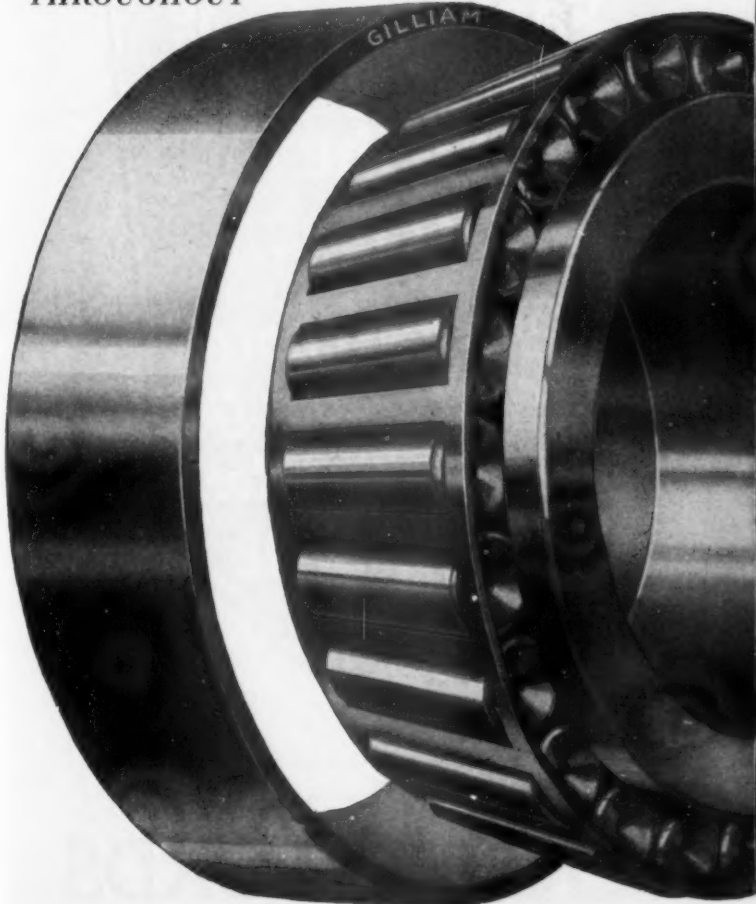


The rollers in GILLIAM Tapered Roller Bearings are contained within a clean-cut, one-piece, steel stamped cage flanged inward on the small diameter, thus insuring rigidity and durability.

GILLIAM Bearings are made for practically every application and location in all makes of cars.

Axle manufacturers equipping with Gilliam Tapered Roller Bearings include: Adams, Salisbury, Columbia, Torbensen, Clark, Flint, U. S., Sheldon, Wisconsin, Vulcan, Standard Equipment.

Cups, Cones, Rollers
**ALLOY Steel
THROUGHOUT**



Gilliam service parts and bearing replacements are available at any of the following distributors:

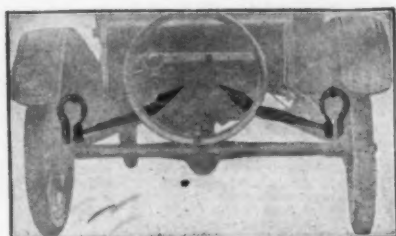
Sub-distributors not listed.

AKRON, Ohio, Ahlberg Bearing Co., 369 S. High St.
ALBANY, N. Y., Fafnir Bearing Co., 108 Central Ave.
ALBUQUERQUE, N. Mex., Hoover Motor Co., 416 W. Copper Ave.
ATLANTA, Ga., Ahlberg Bearing Co., 222 Ivy St.
ATLANTA, Ga., Southern Bearing Co., 375 Edgewood Ave.
BALTIMORE, Md., Ahlberg Bearing Co., 1710 N. Charles St.
BALTIMORE, Md., Motor Parts Corp., 1419 N. Charles St.
BOSTON, Mass., Ahlberg Bearing Co., 874 Commonwealth Ave.
BROOKLYN, N. Y., Ahlberg Bearing Co., 481 Lafayette Ave.
BROOKLYN, N. Y., The Gwilliam Co., 23 Flatbush Ave.
BUFFALO, N. Y., Ahlberg Bearing Co., 354 Main St.
BUFFALO, N. Y., Buffalo Bearing Co., 1630 Main St.
BUTTE, Mont., Butte Automobile Co., Inc., 25 E. Galena St.
CANTON, Ohio, Dine-DeWees Co.
CHARLOTTE, N. C., Southern Bearing Co., 12 Poplar St.
CHICAGO, Ill., Ahlberg Bearing Co., 317 E. 29th St.
CHICAGO, Ill., Ahlberg Bearing Co., 2715 Michigan Ave.
CHICAGO, Ill., L. C. Smith Bearings Co., 2208 S. Michigan Ave.
CINCINNATI, Ohio, Ahlberg Bearing Co., 23 E. 8th St.
CINCINNATI, Ohio, E. J. Hebbard, 205 E. 8th St.
CLARKSBURG, W. Va., Clarksburg Auto Service Co.
CLEVELAND, Ohio, Ahlberg Bearing Co., 4217 Euclid Ave.
CLEVELAND, Ohio, Automotive Bearing & Equipment Co., 7523 Carnegie Ave.
COLUMBUS, Ohio, Ahlberg Bearing Co., 348 E. Long St.
COLUMBIA, S. C., E. A. Jenkins, 1220 Park Ave.
DALLAS, Texas, Ahlberg Bearing Co., 1307 Young St.
DAYTON, Ohio, Lewis Motor Mart Co., 27 E. 2nd St.
DENVER, Colo., Ahlberg Bearing Co., 7 W. 13th Ave.
DETROIT, Mich., Ahlberg Bearing Co., 4210 Woodward Ave.
DES MOINES, Ia., Iowa Bearing Co., 1106 Grand Ave.
DULUTH, Minn., Ahlberg Bearing Co., 1099 E. First St.
ELMIRA, N. Y., John C. Sheely, 247 Water St.
ERIE, Pa., Lejeal Cycle & Mobile Works, 1721 Sassafras St.
EVANSVILLE, Ind., Lannert Mfg. Co., 208 S. 6th St.
FRESNO, Calif., Ahlberg Bearing Co., 2124 Tuolumne St.
GRAND RAPIDS, Mich., Brown & Seiler Co.
GREEN BAY, Wis., Lucia Bros.
GREENVILLE, Pa., Munz & Wright Co.
HAGERSTOWN, Md., Ludwig Tire & Accessory Co.
HARRISBURG, Pa., Standard Auto Supply Co.
HARTFORD, Conn., Kenyon Bearing Co., 102 Allyn St.
HOUSTON, Texas, The Bearings Co. of Texas, Inc., 619 Preston Ave.
INDIANAPOLIS, Ind., Auto Equipment Co., 1021 N. Meridian St.
INDIANAPOLIS, Ind., Ahlberg Bearing Co., 1005 1/2 N. Meridian St.
KANSAS CITY, Mo., H. H. Kent, 1418 N. Meridian St.
KANSAS CITY, Mo., Ahlberg Bearing Co., 207 E. 18th St.
LOS ANGELES, Cal., Ahlberg Bearing Co., 1708 S. Grand Ave.
LOUISVILLE, Ky., Columbia Motor Truck Supply Co., 117 S. 7th St.
LOUISVILLE, Ky., Andrew Cowan & Co.
LYNCHBURG, Va., Barker-Jennings Hdw. Co.
LYNCHBURG, Va., Myers Bros.
MANSFIELD, Ohio, Wagner Hdw. Co.
MARION, Ohio, Universal Tire & Supply Co., 153 N. Main St.
MEMPHIS, Tenn., Ahlberg Bearing Co., 1088 Union Ave.
MILWAUKEE, Wis., Ahlberg Bearing Co., 459 Milwaukee St.
MINNEAPOLIS, Minn., Ahlberg Bearing Co., 926 Marquette Ave.
NASHVILLE, Tenn., Automobile Bearings Co., Inc., 620 Commerce St.
NEWARK, N. J., Fafnir Bearing Co., 271 Central Ave.
NEWARK, N. J., Ahlberg Bearing Co., 353 Halsey St.
NEW ORLEANS, La., Ahlberg Bearing Co., 726 Girod St.
NEW YORK CITY, N. Y., Ahlberg Bearing Co., 833 Seventh Ave.
NEW YORK CITY, N. Y., Fafnir Bearing Co., 5 Columbus Circle.
NEW YORK CITY, N. Y., The Gwilliam Co., 253 W. 58th St.
NEW YORK CITY, N. Y., S. Fafnir Goodman, 1834 Broadway.
NORFOLK, Va., Norfolk Motor Equipment Corp., 217 Bank St.
OAKLAND, Calif., Ahlberg Bearing Co., 2550 Broadway.
OKLAHOMA CITY, Okla., Southern Motor Supply Co., Inc., 24 W. 5th St.
OMAHA, Nebr., Ahlberg Bearing Co., 1726 St. Mary's Ave.
PHILADELPHIA, Pa., Ahlberg Bearing Co., 934 N. Broad St.
PHILADELPHIA, Pa., Bearings Co. of Pa., 856 N. Broad St.
PHILADELPHIA, Pa., The Gwilliam Co., 218 Chestnut St.
PITTSBURGH, Pa., Ahlberg Bearing Co., 223 Highland Bldg.
PITTSBURGH, Pa., Shipley-Allen, Inc., 329 S. Beatty St.
PITTSBURGH, Pa., The Gwilliam Co., 418 Melwood Ave.
PORTLAND, Ore., Ahlberg Bearing Co., 409 Burnside St.
PORTLAND, Ore., West Bearing Co., 452 Burnside St.
PROVIDENCE, R. I., Ahlberg Bearing Co., 511 Westminster St.
RALEIGH, N. C., Motor Bearings & Parts Co., 403 Fayetteville St.
ROANOKE, Va., Auto Spring and Bearing Co.
RUTLAND, Vt., F. A. Gonyea, 93 State St.
SALT LAKE CITY, UTAH, W. C. Van Horbels, 328 S. West Temple St.
SAN FRANCISCO, Cal., Ahlberg Bearing Co., 116 Polk St.
ST. LOUIS, Mo., Ahlberg Bearing Co., 2831 Locust St.
ST. PAUL, Minn., Ahlberg Bearing Co., 411 N. Exchange St.
SEATTLE, Wash., Ahlberg Bearing Co., 512 Pike St.
SPRINGFIELD, Mass., Krohn's Service Station, 59 Pecoud Ave.
SPRINGFIELD, Mo., Hermann-Sanford Co.
SYRACUSE, N. Y., Syracuse Auto Supply Co., 311 S. Warren St.
TAMPA, Fla., G. Norman Baughman Co.
TOLEDO, Ohio, Ahlberg Bearing Co., 142 10th St.
TULSA, Okla., Tulsa Bearing Co., 721 S. Main St.
UNIONTOWN, Pa., Mitchell-Long Co.
UTICA, N. Y., Utica Cycle & Supply Co., 117 Columbia St.
WASHINGTON, D. C., Ahlberg Bearing Co., 1902 14th St., N. W.
WASHINGTON, D. C., Bearings Sales Co.
WHEELING, W. Va., Republic Motor Co.
WILMINGTON, Del., Automobile Equipment Co.
YOUNGSTOWN, Ohio, Ahlberg Bearing Co., 7 Ridge Ave.
YORK, Pa., Piperburg Auto Parts Co.

GILLIAM
TAPERED ROLLER
Bearings

THE GILLIAM MFG. CO.,
Canton, Ohio

GREY • GOOSE



*They Look Like a Part of the Car and
Give the Riding Effect of a Much
Longer Wheel Base.*

**Offers
You an
Unusual
SALES
AGENCY**

*on the
Easiest Riding
Fastest Selling
Absorber
on the
Market*

*with
Exclusive Control
of City, County
or Larger Territory*

WRITE OR WIRE

INDIANA PARTS CO.
Makers of GREY GOOSE

Dept. 13
RICHMOND,
INDIANA

ABSORBERS For **FORDS**



Let This Jack Sell Itself Leave It On The Counter



Customers always like to handle things that are left on the counter—why not take advantage of this habit and let them “play” with one of these No. 46 Reliables? When they see how easy it works they are sure to want one.

A Reliable No. 46 on the counter will sell itself while you are busy with another customer. This handsome bright red jack will appeal to every motorist. Its sturdiness, its easy and sure action, as well as the special auxiliary foot, are features which will make this jack a fast seller and a good profit maker for you.

The No. 46 is only one of the Reliable line comprising thirty-five different models ranging in capacity from one to ten tons and covering the entire field of automobile jacks.

Ask to see this jack at your jobber's. He has a complete line of Reliable Jacks or will get them for you. All Reliable Jacks are enameled red. Be sure you get only red jacks.

“Ask 'em to buy”

Warning to Dealers: When you buy Reliable Jacks—be sure you get the product of the Elite Mfg. Co., Ashland, Ohio. The Reliable line is being widely imitated and this notice is given for your protection.

Special Offer to Dealers

Fill out and attach this coupon to your letterhead.

Elite Mfg. Co., Dept. MA-2, Ashland, Ohio. Please mail me one of these Jacks. You may bill me through my regular jobber whose

name is

Name

Address

City State

Elite Manufacturing Co.
Dept. MA-2 Ashland, Ohio

Complete stock carried by C. A. Ashton, Ashton Bldg., St. Paul, Minn. Carroll Co., Dallas, Tex.

Representatives: Motor Products Co., 149 Church St., New York; L. E. Spencer Co., 704 Stahlman Bldg., Nashville, Tenn.; A. E. Mohrig, 1454 Pine St., San Francisco, Cal.

**RELIABLE
JACKS**





"My Brand New Tire's Stolen!"

You don't worry much about that blowout, until you get out and start to put on your spare—and find it isn't there! That's exasperating, and mighty expensive.

Cost of tire, loss of time, expense of sending for repair car—all could have been saved by a Powersteel Autowlock, costing \$2.50. At that price, how can you afford to be without one?

POWERSTEEL AUTOWLOCK is made of a four-foot length of weather-proofed Yellow Strand Wire Rope, with a sturdy, non-pickable spring lock. Handy, compact, reliable—thousands in use daily.

Get one for your spare tire. Price now \$2.50, east of the Rockies.

BASLINE AUTOWLINE, also made of famous Yellow Strand Wire Rope, is another dependable necessity. The original wire rope towline. Tight, compact — fits under seat cushion. Price now \$4.95. POWERSTEEL TRUCKLINE, is a heavier line, for truck-towing. \$8.65 with *plain* hooks; \$10.10 with Snaffle Hooks.

JOBBER AND DEALERS: *Here's Quality, Sales, Profits*

These three accessories have the highest quality and reputation; you know that. Besides, there's a steady demand for them, and they pay you a good profit. This page ad in *Motor Age* is a reproduction of one of our ads in National Consumer Publications such as *Literary Digest*, *Life*, etc. Remember, our accessories are the only Nationally-Advertised products of their kind. *And they will make you money!*

BRODERICK & BASCOM ROPE CO., ST. LOUIS—NEW YORK

F151B

POWERSTEEL AUTOWLOCK

An Impressive Quietness of Operation That Speaks Volumes for Quality

THERE is just that about a Usaco Air Compressor—an impressive quietness—an unlabored operation, in fact, an eagerness to operate that is dependable evidence of inbuilt quality.

Contributing to this are: perfectly balanced parts; harmonious relation of one unit to another; exceptionally well finished surfaces, and last, but not least, the long "running-in" test that proves every compressor up to the high Usaco standard before it is shipped.

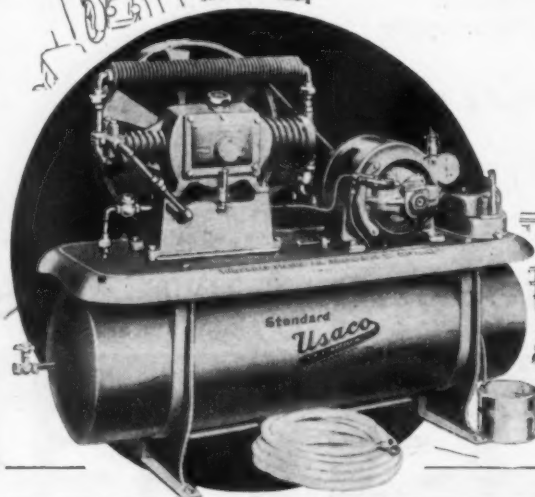
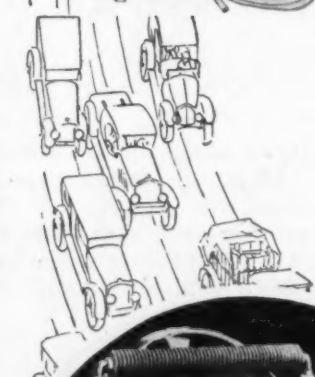
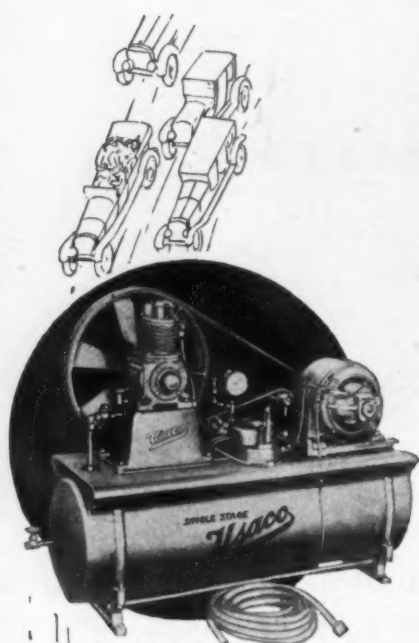
Man's intelligence is so reflected in a Usaco Compressor that it seems almost human itself. To see it start just at the right moment, pick up the load only after full speed is attained; pump with eagerness; stop when full pressure is attained and discharge any oil or moisture that may have accumulated in the filtering trap, is to recognize a machine of top notch, incomparable quality.

The new Usaco Perfect Balance Air and Water Tower is, likewise, a masterful achievement.

The United States Air Compressor Co.

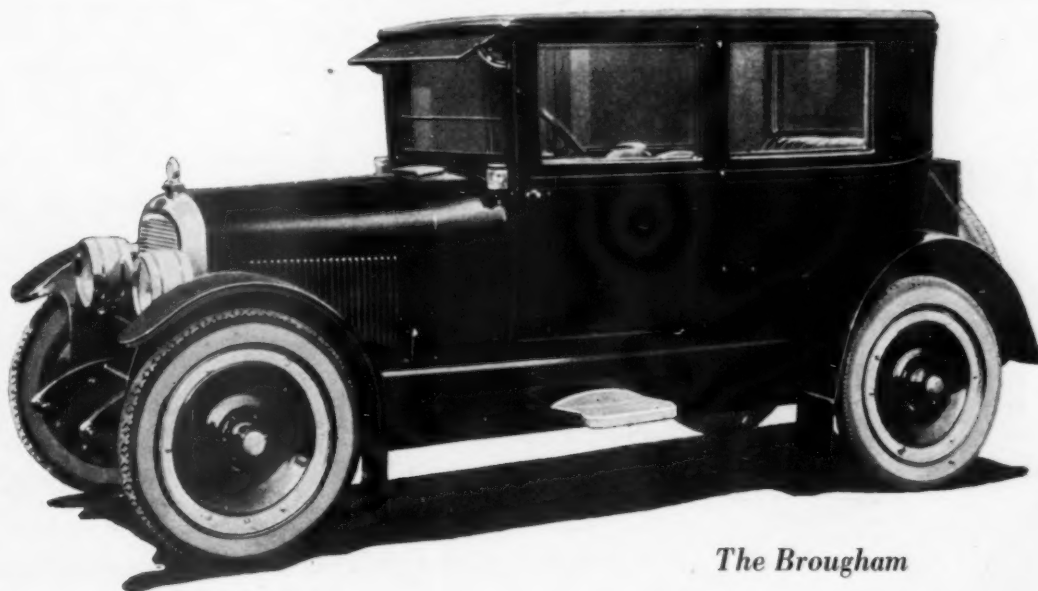
5304 Harvard Avenue

CLEVELAND, O.



Two Stage **Usaco** Single Stage
AIR COMPRESSORS

The Most Completely and Conveniently Lubricated Car in America



The Brougham



Courier Features

Forty-six horsepower 6-cylinder valve-in-head engine. Full pressure dry crankcase engine lubrication. Transmission ball bearings throughout. Powerful, easy-acting brakes. Low-hung chassis with ample clearance. Automatic chassis lubrication—pressure on plunger forces oil to chassis bearings. 32x4 non-skid Cord tires. Large headlights with anti-glare lenses. Bright nickel-plated radiator shell. Custom-built bodies, made complete in Courier plant, roomy, yet smart - appearing. Rattle-proof doors. Choice of five bright colors. Several fabric options. Approximately 20 miles to the gallon of gasoline; over 500 miles to quart of oil, and 12,000 to 15,000 miles on a set of tires.

Chicago Show Space
E-4
Coliseum Annex

To Progressive Merchandisers

Believing that the more progressive type of automobile merchandiser is looking for a car with which he can fill the demand for a car that will meet the requirements of the buyer who wants to express his individuality and who wants distinction in the car he drives, in addition to dependable and care-free service, we are suggesting that you investigate the new Courier.

The Complete Courier Line

STANDARD EQUIPMENT		WITH SPORT FEATURES	
Phaeton, 5 Passenger.....	\$1235	Phaeton, 5 Passenger.....	\$1395
Runabout, 2 Passenger.....	1195	Runabout, 2 Passenger.....	1295
Coupe, 2 Passenger.....	1495	Four Passenger Sport.....	1565
Coupe, 3 Passenger, extra		Coupe, 2 Passenger.....	1595
folding seat	1745	Coupe, 3 Passenger, extra	
Brougham, 5 Passenger	1875	folding seat	1895
Sedan, 5 Passenger.....	2055	Brougham, 5 Passenger.....	1995
		Sedan, 5 Passenger.....	2165

Prices are all F. O. B., Factory

Standard Equipment includes Running Boards with standard fenders, Wood Wheels, Drum Shaped headlamps, windshield wiper, Nickel Plated Radiator Shell, Anti-glare Lens, Custom-built Bodies, choice of five bright colors, automatic Chassis lubrication and dry crank-case oiling.

Sport Equipment includes features listed under Standard Equipment with following changes and additions: Choice of Wood or Disc Wheels, Nickel Sport Drum Headlamps and Cowl Lamps, Combination Stop and Tail Lamp, Bicycle Type Fenders and Individual Steps, unless Running Boards are specifically requested.

In addition the Four Passenger Sport Model carries the following extras without additional charge: Single Bumper, Front and Rear, Visor, Cigar Lighter, Electric Clock, Carpet in front compartment, Leather strap Robe rail, Rear View Mirror, Trunk Rack and Trunk, Guard Bars, Spot Light, Spare Tire and Tube, Snubbers and usual Sport Features.

Write or wire for complete information

The Courier Motors Company
SANDUSKY, OHIO

In 1892 A New York Customer Said—



"Why isn't it practical to manufacture in this country a certain type of plain cable that is now made only in Italy? Importing this cable is very inconvenient. Why not tackle the job and see what you can do?"

We tackled the job and the results were even better than anyone dared to hope for. The cable we produced (now known as **PARANITE** Plain Italian cable) was equal in every respect to the imported product. Our customer was more than satisfied.

This happened 30 years ago and illustrates that even then we were giving a type of service in the cable field that would be a credit to today's progressiveness. Around that first pioneering success we have built a service and a business that are known and respected wherever cables are used.

PARANITE Cables are no strangers in automotive circles. For years they have been used extensively wherever quality cables have been in demand. Thousands of automotive men stick to **PARANITE** because they know the absolute dependability of the line. Where quality is the first consideration **PARANITE** is the choice.

There is a **PARANITE** Cable for every automotive use. Leading jobbers everywhere carry complete stocks.

THE INDIANA RUBBER & INSULATED WIRE COMPANY

Factory and General Offices: Jonesboro, Ind.

210 S. Desplaines St., Chicago



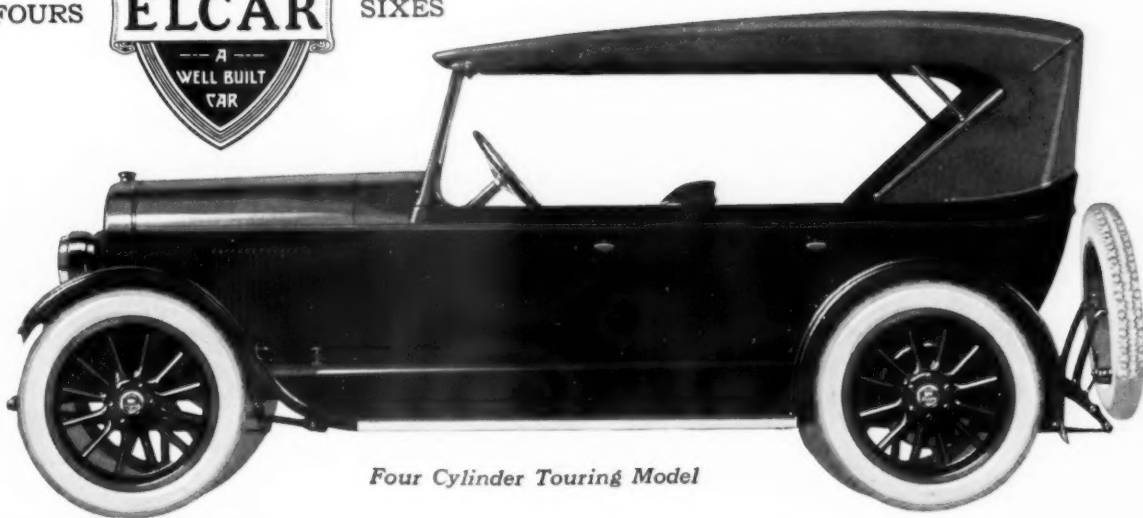
PARANITE CABLE

IF IT'S **PARANITE** IT'S RIGHT

FOURS



SIXES



Four Cylinder Touring Model

ELCAR

A WELL BUILT CAR

DEALERS
Here is the price
range that insures
PROFITS

♦ ♦
FOURS
\$965.00 to \$1425.00
SIXES
\$1395.00 to \$1995.00
f. o. b. factory

New Year — New Profits

Elcar dealers are starting 1923 activities on a program of unparalleled profit possibilities.

ELCAR

FOURS — SIXES — TAXICABS

Just check the completeness of the Elcar line against your selling experience. If you are in business to make money in an organized way and if you want to build up prestige and develop a patronage on which you can rely, the Elcar dealer proposition is ideal. It's written for you.

Write or wire for the facts

ELCAR MOTOR COMPANY, Elkhart, Indiana

Builders of Fine Vehicles Since 1873

—and be sure to ask about Elcar Taxicabs. Big money, quick turnover.

FOURS



SIXES

SELLING THE RIGHT CAR

Analysis of all the six-cylinder motor cars will show conclusively that Elcar represents value beyond the price. In engineering standards, in the character of its units, in power and all other qualities, the Elcar—Fours and Sixes—will be found fully abreast of every advance in motor car construction.

The Elcar Six has 8-R Continental Red Seal Motor.
The Elcar Four has improved Lycoming-Elcar Motor.

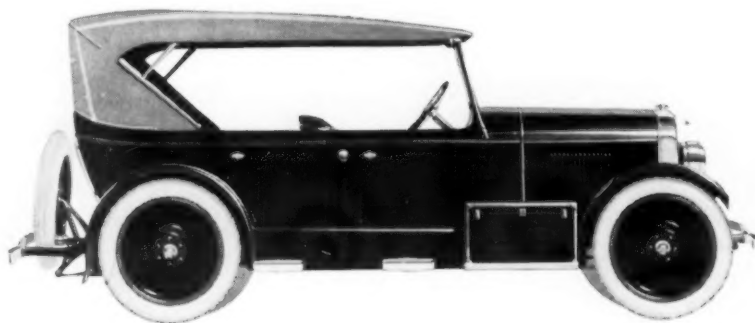
Investigate Elcar's features. The bodies are all Elcar built. When you learn about Elcar you will appreciate its exceptional value and also the company's fixed policy to build only a high grade car and price it honestly.

There's three-fold opportunity in Elcar—Fours, Sixes and Taxicabs. Write for the details of dealer plan.

ELCAR MOTOR COMPANY

Builders of Fine Vehicles Since 1873

Elkhart, Indiana.

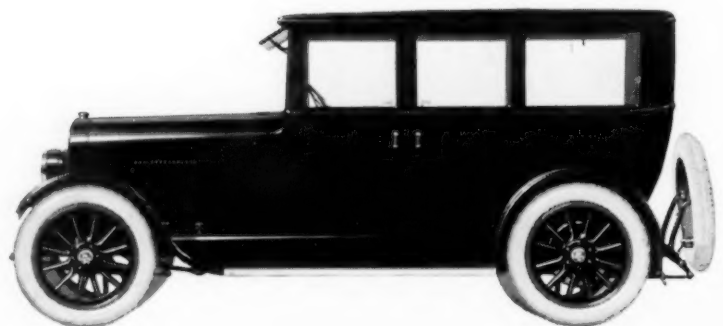


Four-cylinder

ELCAR
SPORT

Four-cylinder

ELCAR
SEDAN





Atlas Ball Quality

The Closest Approach to Perfection

THE successful performance and life of steel balls in their various applications ranging from use in ball bearings for high-speed instruments of precision to supporting the most massive structures such as gun turrets, swing bridges, etc., is dependent upon ball quality—accuracy, uniformity of composition, hardness and resistance to fatigue.

There is only one grade of Atlas Steel Balls—those made to the highest standard of perfection. Every Atlas Ball is perfectly finished and guaranteed to be round and true to size within a tolerance of plus or minus $\frac{1}{2}$ of $\frac{1}{10,000}$ inch. Furthermore;

Atlas Balls are made of the highest grade chrome steel obtainable, so treated that they are really remarkable for their extreme hardness, toughness and durability—having a resistance against shocks and the repeated application of loads that is not approached by any other commercial ball.

Nowhere in the world will you find a ball that embodies every one of these essentials to the same extent as Atlas. This has been proven to the satisfaction of the best engineers in this country and for this reason Atlas Balls have the enviable reputation of being "The Premier American-Made Balls."

ATLAS BALL COMPANY

Glenwood Ave. at Fourth St.

Philadelphia, Pa.

920

ATLAS

STEEL BALLS

ALSO BRASS, BRONZE,

MONEL AND SPECIAL METALS



Made Under
SKF
Supervision

Even With the Present Low Grade Gasoline

The OMAC Delivers Fully Vaporized Fuel—Even at Low Speeds

Outstanding Features

Demonstrated in Actual Service on America's Leading Cars

1. Efficient at all altitudes—and in all weathers, winter and summer.
2. Extraordinary efficiency at low speeds.
3. An instantaneous response to the throttle at all speeds.
4. Only fully - vaporized gasoline enters the mixing chamber, no matter how weak the engine's suction.
5. Marked fuel economy—definitely and immediately apparent.
6. Quick and easy cleaning—only 4 nuts to loosen and the whole bottom portion is removable.
7. An emergency piston, providing proper mixture when you suddenly "step on it" hard.
8. Utter Simplicity of design. Positive mechanical action. No springs, tensions, or automatic devices. No counterweights in float chamber.
9. Only one adjustment—on the idling unit.

The combination of Winter's cold and gasoline of low volatility spells a slow start and labored operation for the engine.

Suggest to your closed-car owners and winter drivers the installation of an OMAC Carburetor.

It meets the lowered volatility with a heightened vacuum pressure that fully vaporizes the fuel under all conditions.

It is especially efficient at low speeds, at which 90 per cent of all driving is done.

Not merely a multi-jet but a multi-unit carburetor, it com-

bines a number (from 6 to 12) of complete vaporizing units, released in series. Each unit contains an individual well of reserve fuel for a quick start. Each unit has its own venturi and separate nozzle.

The operation of the OMAC is positive, mechanical. It does not depend upon springs, or other similar devices subject to derangement. It is simple in the extreme, easily taken apart, quickly cleaned, as nearly fool-proof as possible.

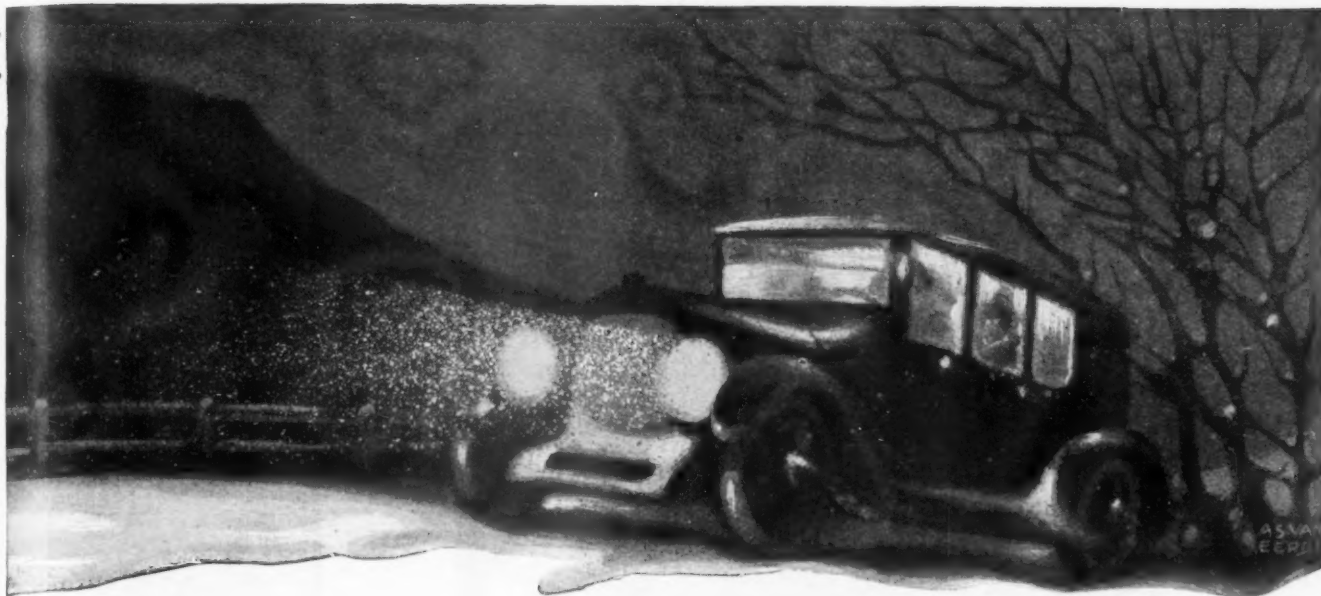
It has only one adjustment—on the idling unit.

Omacc

constant-unit

carburetor

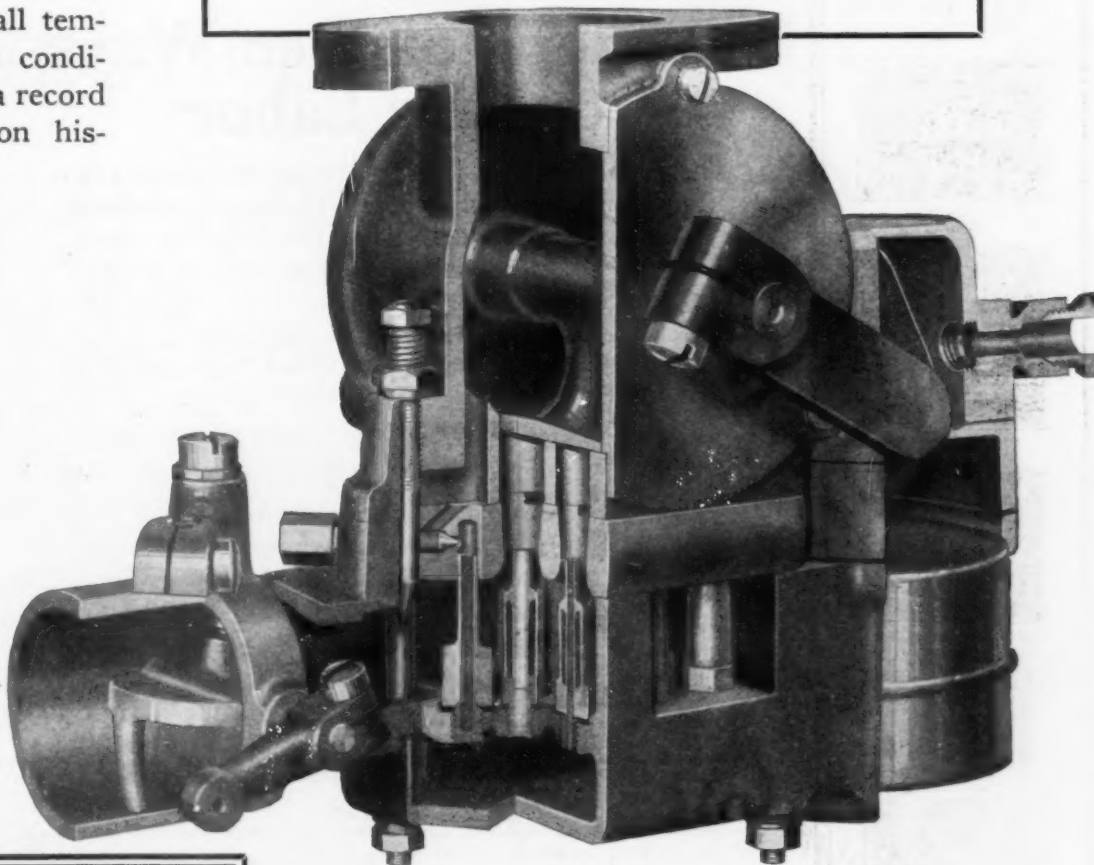
THE JENNINGS
404 No. Richland Stre
PITTSBU



Dealers-Jobbers-Manufacturers

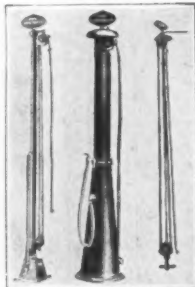
Do not fail to see the OMAC
at the CHICAGO SHOW
Space 39 Coliseum Basement

For three years the OMAC
has been doing duty on the
highest priced cars of
wealthy owners, in all tem-
peratures, under all condi-
tions, and has made a record
unique in carburetion his-
tory.

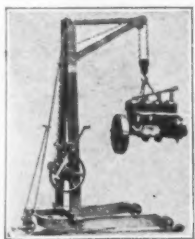


CORPORATION

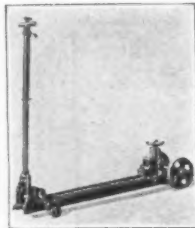
et, Homewood Station
RGH, PA.



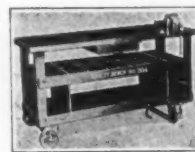
A complete line of Air and Water Stations



Portable Floor Cranes



Hi-Speed Garage Jacks



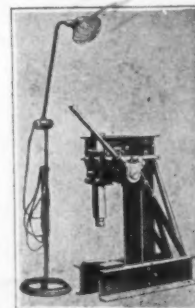
Portable Work Benches



Wrecking Cranes



Double and Single Post Towing Trucks



Garage Light Rack and Pinion Arbor Press



Manley's Sixteen Ways to Save Labor

Easy to operate—quick—reliable—labor saving equipment which even the small business can afford because it pays for itself so soon. Sixteen ways to save money—means sixteen ways to make money.

Check the coupon below and we will send you illustrated and detailed descriptions of the shop equipment that you want.

See Our Exhibit at Chicago—Coliseum, Annex
Space 165-168

*"The Well Equipped Shop
Gets the Business" with*

Manley

Garage Equipment

MADE IN YORK PA.

MANLEY MFG. CO., YORK, PA.

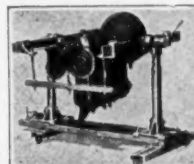
You may send me the name of your nearest distributor and full information regarding the shop equipment checked below.

- | | |
|---|---|
| <input type="checkbox"/> Wrecking Cranes | <input type="checkbox"/> Engine Stands |
| <input type="checkbox"/> Portable Floor Cranes and Hoists | <input type="checkbox"/> Garage Jacks |
| <input type="checkbox"/> Garage and Arbor Presses | <input type="checkbox"/> Portable Garage Light |
| <input type="checkbox"/> Towing Trucks | <input type="checkbox"/> Air and Water Stations |
| <input type="checkbox"/> Portable Benches | <input type="checkbox"/> Truck Wheel Dolly |

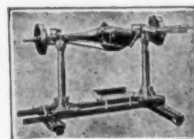
Pin This Coupon to Your Letter Head or Bill Head and Mail Today.



Garage Presses 30 and 50 Tons



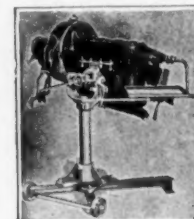
Universal Engine Stand



Universal Axle Stand



Manley Underworker



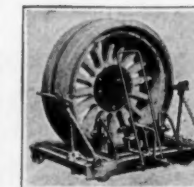
Special Stand for Ford Motors



Split Type Axle Stand




Portable Hoists 2 and 4 Tons



Universal Truck Wheel Handler

Show it—they'll buy it



CONNECTICUT **190-Y**

Replacement Switch

Here is a high-grade Ignition and Lighting control, a single unit that will replace practically any of the various round type standard equipment switches.

Mechanical Features

Handsomely finished beveled Aluminum and black enamel face plate, size to cover space taken by regular round type switch.

Complete with studs long enough for mounting on either wood or metal dash.

Switch block of CETEC, a high dielectric of great mechanical strength. Toggle action (crosswise) for both ignition and lighting controls.

Packed in individual cartons with wiring diagram and mounting instructions. Price,

Lever, with Bright, Dim, and Off positions for lights—

Pin tumbler lock (with changes) with On and Off position for the ignition.

Merchandising Advantages

The universal adaptability of the CONNECTICUT 190-Y switch not only enables you to meet practically every replacement order you get, but eliminates the necessity of carrying a large assortment of switches.

\$4.50

CONNECTICUT TELEPHONE & ELECTRIC COMPANY
Meriden Connecticut

**THE
WAUKESHA MOTOR COMPANY**

*wishes to announce
an entirely new type of
Engine
capable of exceptional economies in
Bus and Truck Service*

*The Sales and Engineering Departments
welcome the opportunity
to present these Engines and their performance
to all patrons of the
New York and Chicago Automobile Shows
and to all those
who will honor them with a request
for detailed information*

*Waukesha, Wisconsin
January 6, 1923*



First Thing to Do— Turn Down Carburetor Adjustment

The "Explosive Spark" is no mere selling-point—it's real; can be DEMONSTRATED to any reasonable man's complete satisfaction. (Read the type in the panel.)

Every T.N.T. Spark Plug has an Auxiliary Combustion Chamber, formed by the small opening in the shell. The gas in this chamber gets hotter, dryer and COMPRESSED. When the spark occurs, it has the explosive force of a howitzer, shooting far down into the cylinder.

Result—More Power. No missing, even with old oil-pumping engines. ALL of the gas is burned. None is left to form carbon. In fact, every explosion sweeps the T.N.T. Plug "clean as a hound's tooth."

GUARANTEED to be oilproof, carbonproof, non-fouling. Retail \$1.

DEALERS. The T.N.T. proposition is worthy of your most serious consideration. Remember, the T.N.T. is no ordinary plug, but is one that will sell to all, regardless of what plugs they are using now. Rapid turnover, liberal margin of profit. Return the coupon, and get the story straight from headquarters.

Distributors. We are placing a few additional distributors. If you believe that you can qualify with us, you are invited to return the coupon.

NT
SPARK PLUG
with the explosive spark

Operates on a leaner mixture

Make This Demonstration

Make the best carburetor adjustment that you can with the plugs now in a motor. Then install a T. N. T. Spark Plug in each cylinder, start the motor, and when thoroughly warmed up, but not until then—SLOWLY TURN DOWN THE ADJUSTING-SCREW, THUS REDUCING THE AMOUNT OF GASOLINE FLOWING THROUGH THE CARBURETOR. When best results are experienced, you are ready for a road-test. More power on hills, quicker pick-up, better gas mileage will be the invariable result. Hundreds of such tests prove this.



The T.N.T. Spark Plug Co.
3058 West 106th St., Cleveland, Ohio

Send along your DISTRIBUTOR proposition.

Name _____

Address _____

Warm friendships and cold cash!



The car owner is in a bad fix when his flywheel gears get battered and stripped.

His starter works poorly if it works at all and he sees the added expense of a new flywheel looming up on the horizon.

But right there you step in and tell him about the Logan Ring Gear and how you can grind off the battered gears and shrink it on over the old flywheel—and how it won't hold up his car even a day—and won't cost so much either—and how it will make his flywheel better than new because it will be better proof.

Oh-boy! That's the stuff of which friendships are made.

And the beauty of it is that while you're making warm friends with this fine efficient service—you're making real money at the same time.

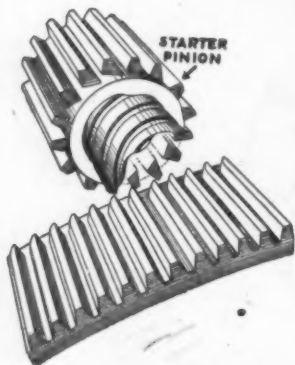
The Logan Ring Gear is a quality product. Made of a bar of 1035 S.A.E. steel, shaped to a ring, heat treated and electrically welded at the joint—it has no weak spot.

Logans are made for all cars.

Installations are not difficult. Any lathe equipped shop can do it.

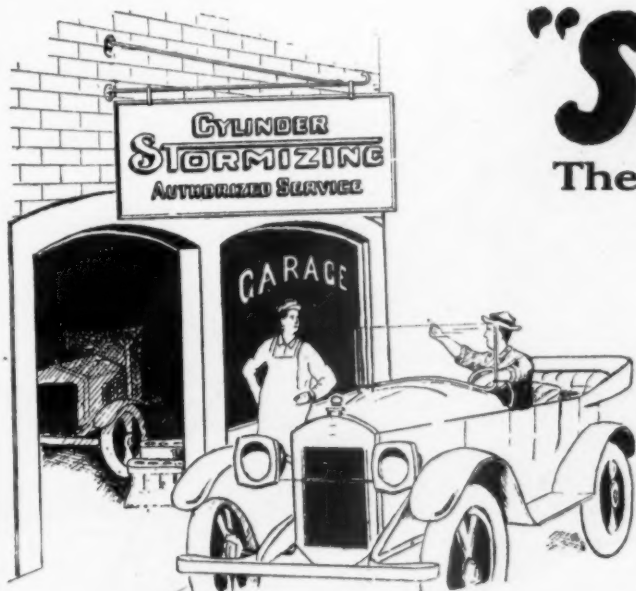
LOGAN FLY WHEEL RING GEARS

The opportunity for flywheel gear replacements is big—and means a worth while source of profit. Don't let this business go to the other fellow. Write for the Logan proposition.



The teeth of the Logan gears are chamfered to a rounded angle of 45°, leaving a 1/16" land on the edge. This design, developed in collaboration with one of America's greatest starter manufacturers, insures a quiet, easy mesh with starter pinion besides affording maximum strength to each tooth.

KAUFFMAN METAL PRODUCTS CO.
BELLEFONTAINE OHIO



"Stormizing"

The Better Method of Cylinder Refinishing

Here is the sign of better service—a sign that is opening up a new field of money-making opportunities to garage men, repairmen and service stations. Right now is the time to investigate Stormizing Machines—to see for yourself just what is this new cylinder refinishing method.

Why Pass Up The Profits of Cylinder Work?

Why not get all the profits from your motor repair jobs? By the Stormizing process the worn cylinder is first trued up by a cutting operation, then by a grinding or honing process given a "gun-barrel" finish.

Stormizing Machines are automatic and self-centering. Right in your own shop you can now produce with a patented Stormizing Machine "cannon bore" trueness and "gun-barrel" finish on any kind or size of cylinders.

Stormizing Machines remove as little or as much metal as is necessary for the job in hand. Handles everything efficiently, from slight ring wear to deep wrist pin scores.

With each Stormizing Machine we furnish an attractive sign for your building and a supply of trade helps to aid you to bigger, better service and splendid profits.

Learn for yourself what Stormizing can mean to you in added business and profits. Become the Authorized Stormizing Station in your locality.

Write today for full information.

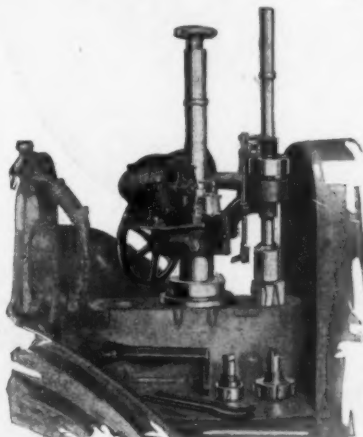
STORM MFG CO

Dept. A

406 Sixth Ave. S.

Minneapolis, Minn.

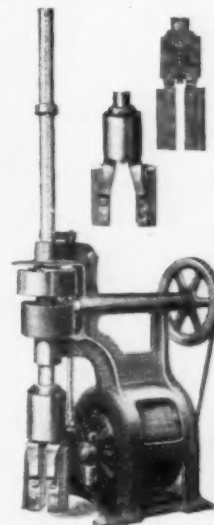
Storm Finishing Head. For use with drill press or electric drill. Capacity 2 1/4" to 8".



Portable Stormizing Machine. capacity 2 1/4" to 4 1/4". For motor drive.



Semi-portable type. capacity 2 1/4" to 6", built for motor drive or drill press.



Automatic Finishing Machine with a capacity of 2 1/4" to 8".

STORMIZING

"The Better Method of Cylinder Refinishing"



STROM BEARINGS

Are Standard Equipment on
Most of America's
Fine Cars

Under unusual loads and high speeds, bearings will soon reveal whether or not they can be depended upon for satisfactory service.

Strom Bearings have met the demands of the most discriminating engineers. Their confidence is based on performance records, careful design, high-grade materials, and accurate workmanship of these bearings.

The Strom catalog contains sizes and load-carrying capacity data covering all standard bearings. You should have it on file.

U. S. BALL BEARING MFG. CO.
(Conrad Patent Licensee)

4551 Palmer Street

Chicago, Ill.

Strom
BEARINGS

*"Wherever
a Shaft Turns"*



Performance—Increased Demand—Increased Production— Lower Prices Now on Dowmetal Featherweight Pistons

Many who have heard of the wonderful performance of "DOWMETAL" Pistons will be glad to get the news.

This metal, developed by special chemical process, may now be had at a lower price. Increased production is the reason.

Every change to "DOWMETAL" brings new evidence that its lightness, its toughness, and its smooth-running qualities mark it as the most notable improvement for modern motors.

Many notable races were won and track records lowered in 1922 with "DOWMETAL-equipped" cars.

Sedans and touring cars have run more smoothly with less expense and repair and with **practically no vibration.**

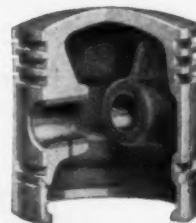
Trucks and Busses, Speedboats and Planes have used "DOWMETAL" Pistons in the severest test a motor can know with the same answer—more smoothness—more power—all the speed one dares to use.

You take out the buzz and rattle and remove the drag and jerk when needless weight is removed from reciprocating parts.

Make your new car better or your old car faster and smoother than when new. Ask your garageman about "DOWMETAL"—what it is—what it does. Write for descriptive folder.

Write for
New Price List
of

DOWMETAL



Lower Prices Effective
February 1st, 1923

The Dow Chemical Company, Midland, Mich., U. S. A.

Makers of Industrial and Heavy Chemicals,
Pharmaceuticals, Insecticides, Dyes and Dowmetal





Regrinding Vital for Repair Shops

If you are in any way connected with the maintenance of automobiles you should look very carefully into the proposition of Cylinder Regrinding. Particularly is this true if you are centralized in a territory where there are a large number of registrations.

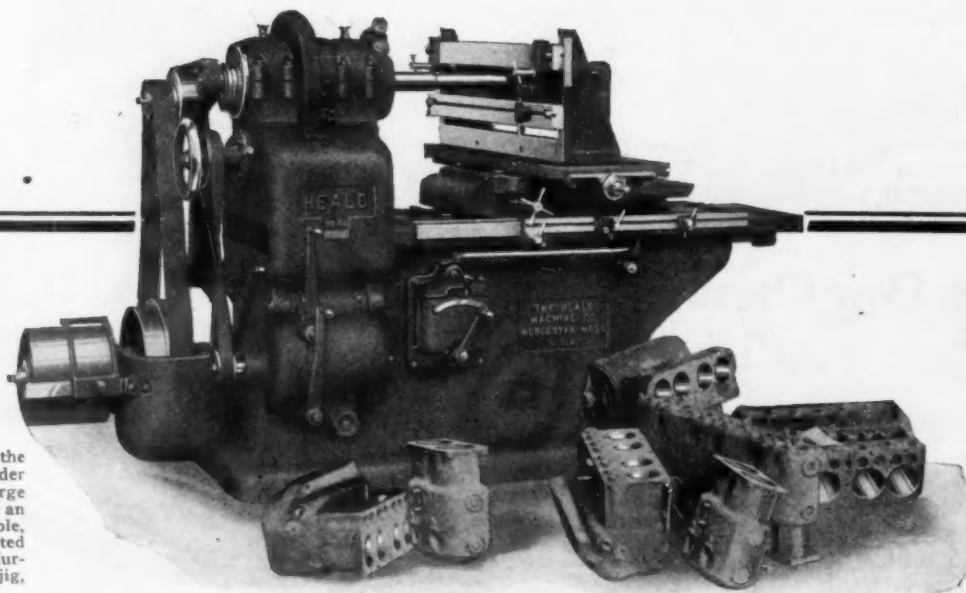
There is no question but what Cylinder Regrinding is becoming recognized as an absolute necessity when overhauling and whether you are in a position to put in a machine for doing this work personally, or expect to send it out to someone who does, you should be thoroughly sold on the proposition. A shop that is prepared to handle this work is recognized by the automobile owner as up-to-date and can furnish service and will complete a job which will give him thorough and lasting satisfaction.

The biggest bulk of the regrinding business comes in the Spring and if you are preparing to take on this work we urgently advise you to get in touch with the Heald Machine Company at once so that there will be no lost time.

Automobile owners insist on Heald ground cylinders to bring them back to their original efficiency as they know that all manufacturers use this machine exclusively for this work. It is unusually simple to operate, has a capacity that will handle any bloc that may come into your shop, and will give you a better finish with greater production than anything else on the market today.

The Heald Service, both in regard to a demonstrator and advertising suggestions, are invaluable to the beginner. Can't we send or personally explain all the advantages of this machine?

The Heald Machine Company
61 New Bond St., Worcester, Mass.



HEALD
Style No. 50

shown at right, is the very latest Cylinder Grinder—massive, large capacity, simple, with an hydraulic drive for table, giving an unlimited range of speeds and furnished complete with jig, ready to go to work.

Grind with a
HEALD
and be sure



Vital Problems in Heavy Duty Transportation Solved!

Stage line transportation is highly perfected on the Pacific Coast. Loads are heavier; higher speeds, longer runs, and schedules fixed by Public Service Commissions must be maintained.

In overcoming such handicaps, the two chief factors of successful transportation have been satisfactorily solved. COSTS have been lowered—and SAFETY increased.

Passenger and fast trucking service is rapidly increasing everywhere. The demand for a tire that stands the gaff is **already created**. Samson Cords are the proven choice in the world's severest testing ground. You can find out HOW by sending for free booklet "Serving Heavy Duty Transportation Profitably."

Samson Tire & Rubber Corporation
412 West Pico Street
Los Angeles, Cal.

The Murrietta Stage Line, one of the leading Pacific Coast organizations, operates a fleet of high speed stages out of Los Angeles to Murrietta Hot Springs.

Their stages make complete round trips daily of 200 miles and obtain an average of 25,000 miles of service from Samson Tires, with greater SAFETY.

That's why their equipment is 100 percent Samsons.



SAMSON SUPER SIZE- CORDS

How We Help You

C-O SHOP equipment increases sales by doing better, faster work; it lowers costs by reducing waste of time and labor.

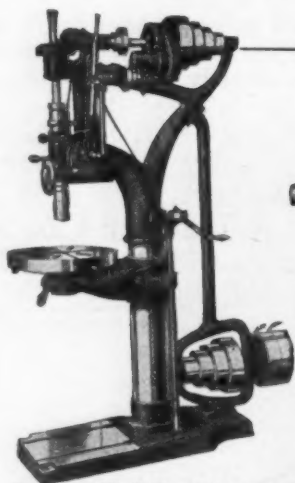
This extra profit can now be realized at once, under the C-O Credit Plan. By investing only one-fourth of the cost, the full earning power of C-O equipment is immediately added to your income. Resulting increased profit not only enables easy payment of the balance, but leaves a handsome surplus besides.

In thousands of shops all over the world, C-O equipment is demonstrating its ability to increase profit and to better the quality of work.

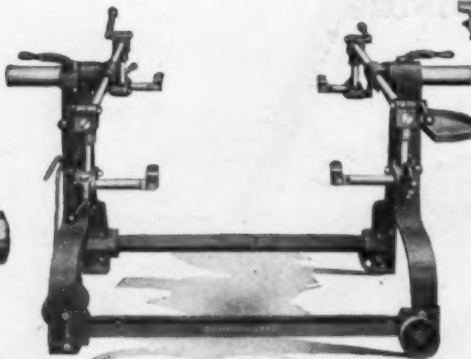
Old fashioned hand methods can no longer compete. To get business in satisfactory and profitable volume, modern, up-to-date shop practices are essential.

As an aid to utmost efficiency, C-O equipment is unexcelled. It incorporates the latest ideas of prac-

CANEDY OTTO



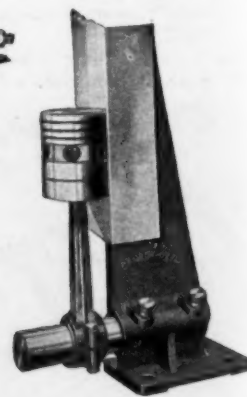
The C-O 21" Drill combines every operating convenience with quality and dependability unsurpassed.



The C-O Universal Motor Stand is the handiest and most flexible stand ever built, enabling one man to mount engines of any type or size.



Oversize bearings provide unusual length of life in C-O No. 3 Floor Grinders.



The C-O Universal Connecting Rod and Piston Aligner is indispensable for accuracy.

Make More Money

tical shop men. It benefits still further by fifty years of experience in building high grade shop tools and machinery. This makes it unequalled in service and satisfaction.

C-O equipment is also surprisingly moderate in cost. Manufactured complete in the extensive C-O shops, under the most advanced and scientific production methods, it combines utmost quality and value.

Build for better, bigger business by consulting your jobber about C-O equipment and the C-O Credit Plan. Also write for our big catalog, showing a complete line of money-making tools and machinery for every shop purpose. Today's action determines tomorrow's profit.

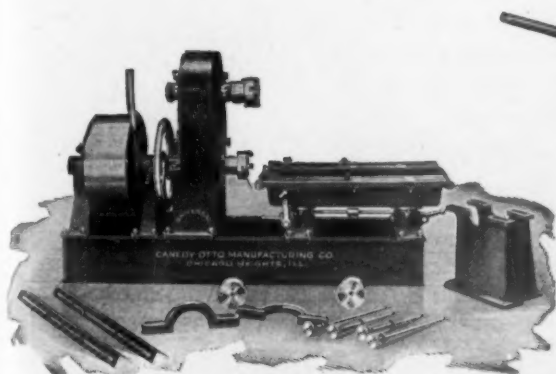
Address Dept. A

CANEDY-OTTO MFG. CO.

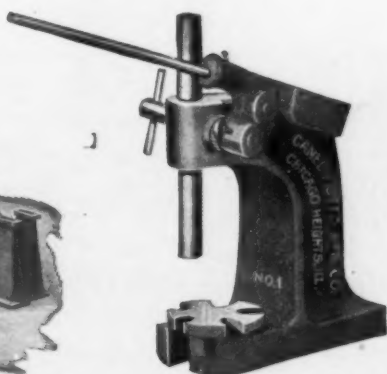
Manufacturers of Automotive Equipment, Drills, Punches, Shears, Shrinkers, Countershafts, Grinders, Buffers, Forges, Blowers, Tuyere Irons and Blast Gates.

Main Office and Factory—Chicago Heights, Ill.
New York Branch—407 Broome St.

***"The Well-Equipped Shop
Gets the Business"***

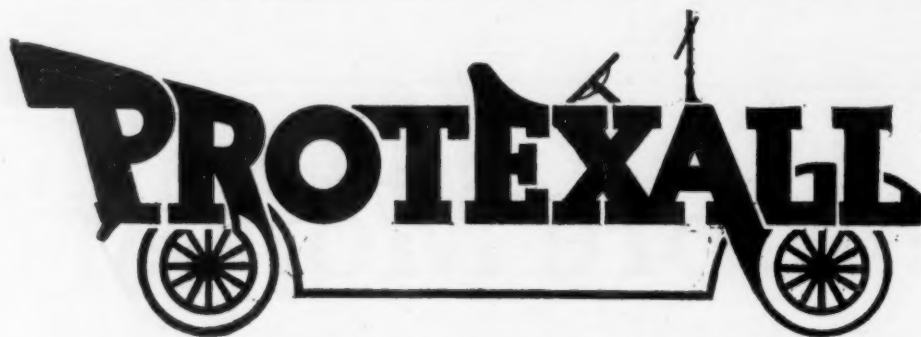


The C-O Universal Burning-In Machine fits 95% perfect bearings in any type or size of engine in from 45 minutes to an hour. Compare this with hand labor. Bearings are in full view during "burning-in" operation.



Ratchet feed of the 3-ton C-O No. 1 Arbor Press gives maximum ease of operation.





One Piece Overall Suits

Your Best and Most Profitable Buy in Work Garments



THE car owner, driver or mechanic who forms the habit of wearing PROTEXALLS over his clothes when working around his car, has absolute assurance of complete protection from dirt, grease, dust and grime. The one piece feature prevents PROTEXALLS from catching on working parts of car. And that is not all. PROTEXALLS are comfortable to the last degree. PROTEXALLS render lasting, satisfactory service. The material is hard woven army colored khaki which washes and wears well.

PROTEXALLS' Exclusive Features Anyone Will Appreciate

All buttons are covered by a fly and cannot scratch the car's surface; the collar is adjustable; seven large roomy pockets; all seams double stitched and felled; absolute freedom of movement in any position. Easy to slip on and off.

Dealers: Here's a Feature Which Turns Dead Expense Into Live Advertising

Equip your drivers and mechanics with PROTEXALLS. Have your name sewed on the back of each garment in big, bright attractive letters. Your name isn't printed on or put on with cutout letters which easily come off or get out of shape when washed. The lettering is a solid mass of stitching right on the garment, using fast color Turkey Red thread. The letters may be of any style you designate. PROTEXALLS come in individual dust-proof cartons—fresh and clean—ready to put on.

Write Us for Complete Information on PROTEXALLS

PROTEXALLS are sold only through jobbers. Every jobber's salesman should be well acquainted with this line. However, we shall be glad to supply full information and answer any correspondence addressed to us.

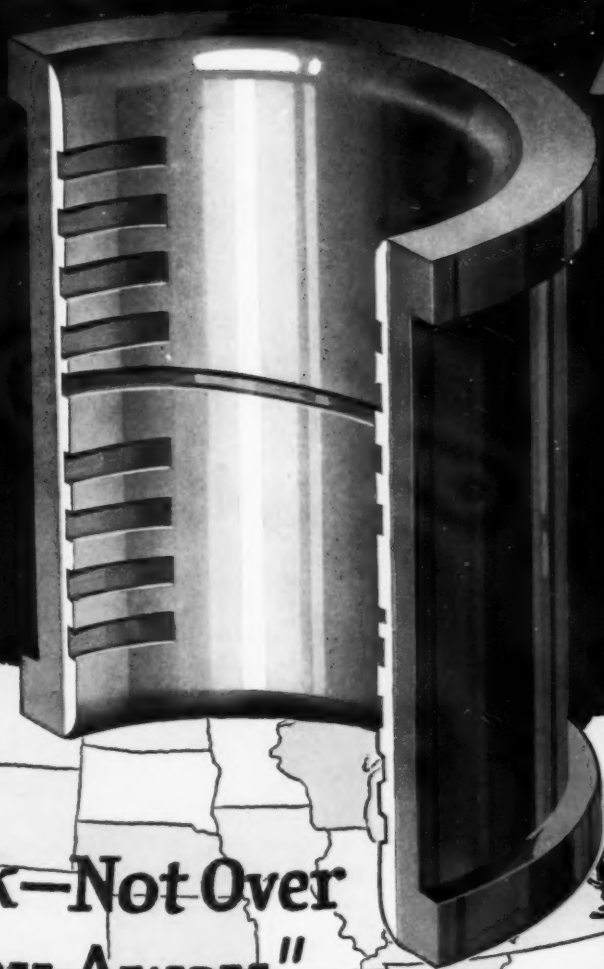


The PROTEX Coat is the equal of the PROTEX-ALL One Piece Suit in quality, workmanship and service. It is supplied in various cloths and colors. PROTEX is preferred by salesmen and other contact men because of its stylish appearance. It is full cut; knee length; belted; with two-style collar; two convenient, roomy pockets. Write us for full particulars.

THE PROTEXALL CO., 100 Pearl St., Abingdon, Ill.

Announcing

*a great National Service
on a Greater Bearing!*



**"In Stock—Not Over
a Day Away"**

MILWAUKEE connecting rod and crankshaft bearings — famous among thousands of repairmen — are now "in stock" in every state. A super-service—as broad as the nation—is now added to a great bearing that first made its good name through downright quality.

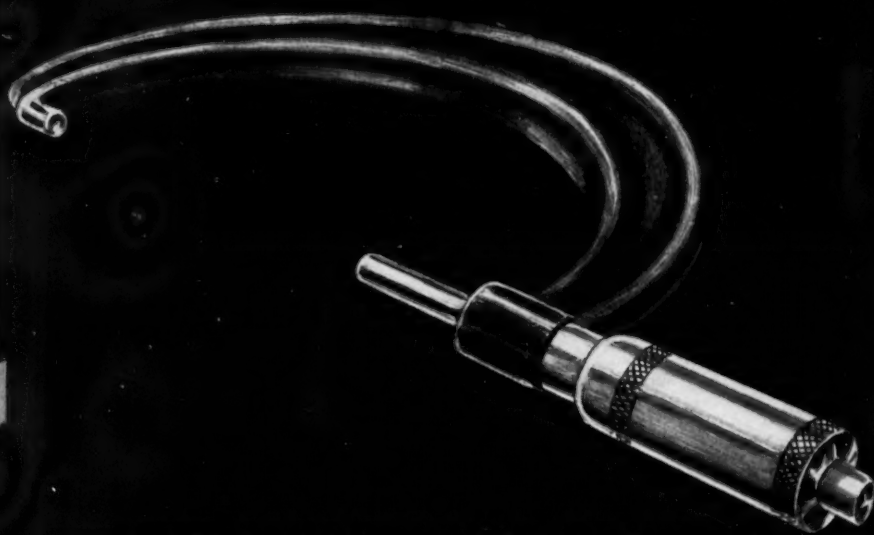
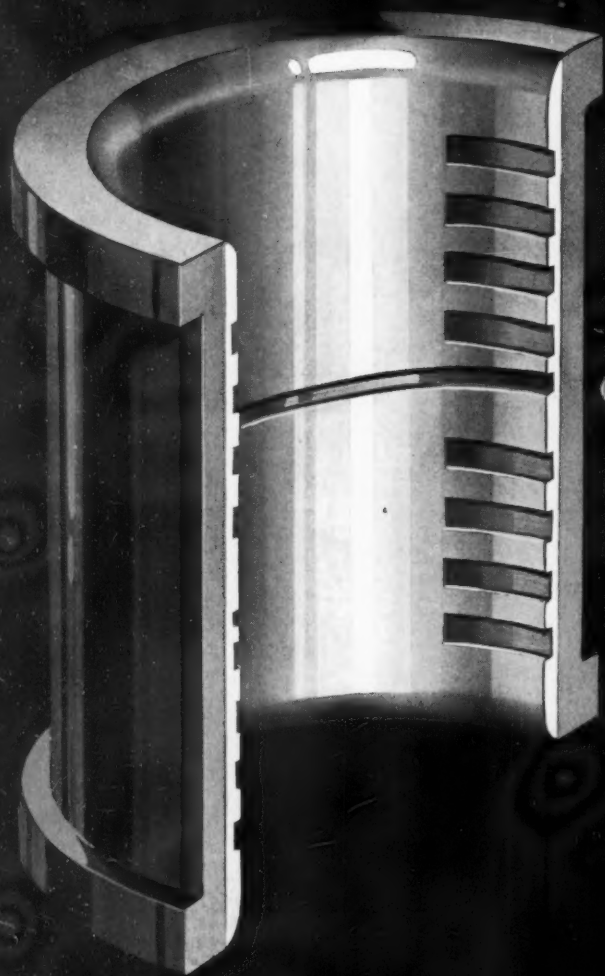
NOW! Near you—*not over a day away*—is one of the 400 "Milwaukee" distributing organizations.

Near you is a complete "Milwaukee" bearing stock for practically every popular make of car, truck or tractor. Near you, in other words, is a super bearing-service — the kind that keeps customers from getting soured on the shop; the kind that guarantees your promise of delivery and lets you finish without giving an alibi.

MILWAUKEE DIE CASTING CO.
MILWAUKEE WISCONSIN

MILWAUKEE "Not Over a Day Away" **BEARINGS**

*Made as You would build them
if you were in
this business*



YOU'D build them *right*—that's certain. No one knows better than you the importance of rugged precision in a bearing. That's the "why" of our use of only pure virgin metal in "Milwaukee" bearings—clear, clean stock without a flaw or bubble; solid bronze backs, where bronze backs are used; machine-finishing both before and after babbitting. And every one is ten-times-tested in inspection.

There's money in handling "Milwaukee" bearings, too—besides the confidence that your work is going to stand up.

Write today for name of *your* "Milwaukee" distributor and a copy of our handy booklet which lists cars, trucks and tractors—with bearing stock numbers for each.

MILWAUKEE DIE CASTING CO., Milwaukee, Wis.

MILWAUKEE

"Not Over
a Day Away"

BEARINGS

You Don't Remove the Engine Bloc

AT the New York Show — crowds gathered around the Auto-Hone booth.

Dealers—Service Station Managers — Garage Owners — were amazed at the sight of the Auto-Hone resizing cylinders as they stood and watched it.

From every side came remarks about the thoroughness of the job —the smooth, clear, polished cylinder wall—the completeness of it.

And that is why the car owner doesn't have any "breaking in" annoyance. The Auto-Hone leaves such a polished surface that a car, after resizing, can step out at high speed.

The Auto-Hone is a true wonder worker. Ask the man who uses one. Dealers — Service Station Managers — Garage Owners—Do it Now. Send in that coupon.

*the modern way of resizing
cylinders*



The Auto-Hone at work in the Oldsmobile Service Station in New York. Every day it is used it makes a big profit.

The AUTO-HONE consists of a center arbor mounting on its circumference honing stones. These stones are held in trays and their position is adjustable to fit any cylinder size between its minimum and maximum.

Two sets of stones are furnished, one for quick cutting and the other for fine honing. Changing from coarse to fine stones or reverse takes only a few seconds. Simply grip the stones at the finger slots and pull them downward and out. Slip the other set into place just as easily.

Pressure on the stones is regulated from the driving end of the tool. The

tension bar insures perfect alignment and correct pressure against the cylinder walls at all times.

Made in two sizes to fill any Auto Cylinders up to $4\frac{1}{2}$ " and its over-sizes.

A Price \$85.00

for cylinders of $2\frac{13}{16}$ " to $3\frac{3}{8}$ " bore.

B Price \$95.00

for cylinders of $3\frac{1}{2}$ " to $4\frac{1}{2}$ " bore.

Your own shop drill operates the AUTO-HONE



See the
AUTO-HONE
at the Chicago Show
Space 74
Coliseum Annex

The AUTO-HONE CO.
1587 Main St., Buffalo, N. Y.
Gentlemen:

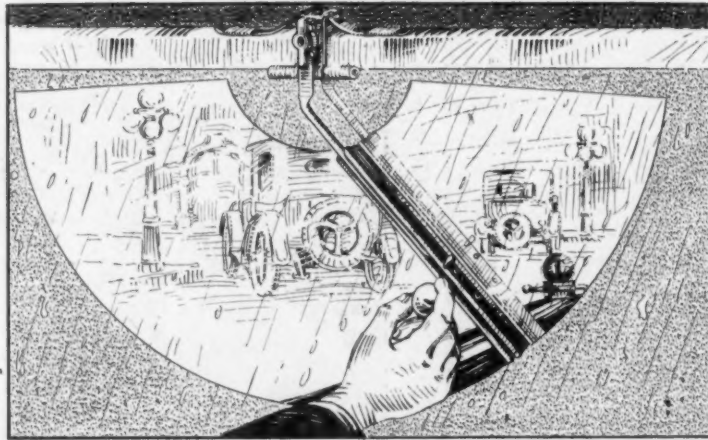
Please send at once complete information and prices of the Cylinder AUTO-HONE. This does not obligate me in any way.

Name _____
Address _____
City _____
State _____

American Automatic Devices Company

Foremost manufacturer of

Perfected Windshield Wipers in the World



The *Kleanall* Windshield Wiper

Made of spring brass, beautifully nickel-plated and polished. Scratchless felt inside squeegee and fine floating stock rubber outside squeegees. Squeegees chemically treated, so that one or two sweeps of the wiper cleans the windshield perfectly. For all cars — open or closed. Easily installed—just press the spring clamp and it's on. Retail price \$2.50 complete.



The *RAINO* Windshield Wiper

For all cars—open or closed models. Easily installed—has a spiral spring adjustment feature. Always has an even wiping tension. Finished in nickel with black trimmings. Remarkable value for \$1.50.



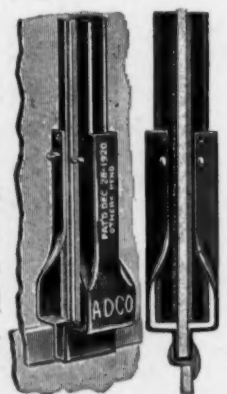
The Genuine *CLEARVISION* SHIELD WIPER

The lowest-priced practical windshield cleaner on the market. Known everywhere. The illustration clearly shows its construction and use. Price only 60c.

We have been making windshield cleaners for years and our products are right—in quality—in price and in satisfaction. From the inexpensive sixty-cent "Clear-Vision" to the "Kleanall" at \$2.50. Our windshield cleaners can be absolutely relied upon.

The *ADCO* Windshield Wiper

The Adco slips between the windshield glasses. Cleans both sides of the shield at once. For closed cars. Easily and quickly installed. Retails \$1.50.



Dealers—If your local jobber cannot supply you with our line of windshield wipers, write us and we will put you in touch with the nearest jobber who carries our line. It will pay you!

American Automatic Devices Co.

515 W. Monroe Street

76 Varieties of Automotive Accessories.

Chicago, Ill., U. S. A.

MERCER

IT is a fact, easily proved by any observing person who visited the New York Automobile Show, that few fine cars received so much careful consideration and favorable comment from so many interested people as did the new Mercer Six.

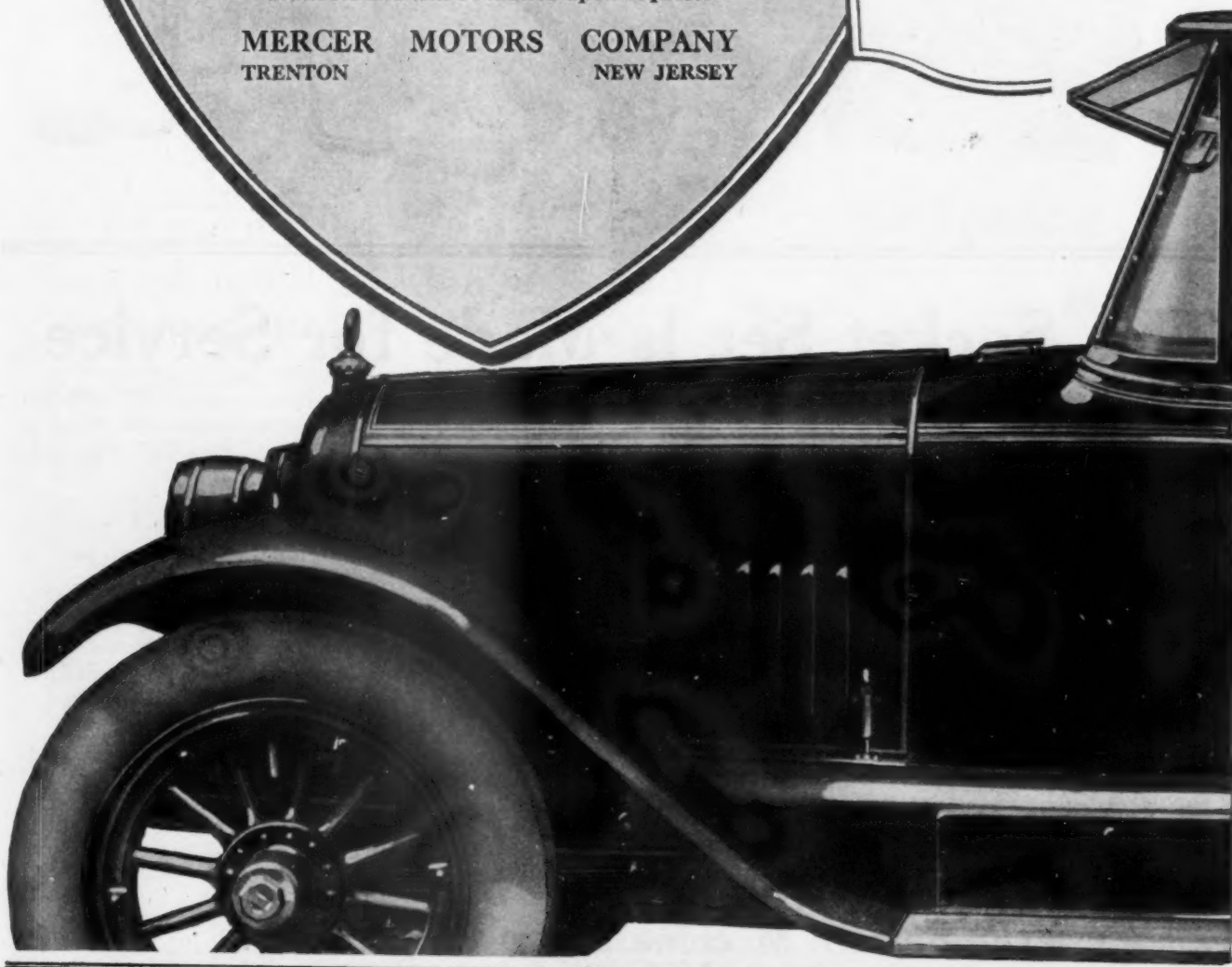
In every city where Mercer is not already represented, there is a splendid opportunity for enterprising firms now handling good selling cars in a lower price class to materially increase their present income. A request for the details does not obligate in any way

An illustrated description of the new Six is now available and will be mailed upon request.

MERCER MOTORS COMPANY
TRENTON NEW JERSEY

A Detail of Mercer Construction

Connecting rods are carefully machined on outside, and drilled to reduce weight. Pistons are light in weight and accurately balanced. Another evidence of Mercer precision.



SOCKET H & G WRENCH



Ordinary sockets are formed by broaching or expanding the metal. H & G Sockets are cold-drawn, and specially heat-treated and hardened and are much stronger.



H & G Speed Wrench Fits all the Sockets and Attachments

This Socket Set Is Made for Service

Strong, Flawless Sockets

H & G Sockets are cold-drawn from close-grain bar steel, especially heat-treated and hardened, while ordinary sockets are formed by broaching or expanding the metal to shape. Our special process produces sockets that are materially stronger, tougher and more durable.

A Dependable Ratchet

Most ratchets fail to ratchet after you have used them a few times, but here is **one** ratchet that **never** fails. You can depend upon it to work every time. It is reversible, very strong and compact and attachable to the H & G Speed Wrench and other wrench parts.

All the Wrench Equipment You Need

The H & G Universal Set comes complete with Sockets, Adjustable T Handle, Ratchet, Universal Joint, Extension Piece, Screwdrivers and Box Wrench.

With this assortment you can make **122 different combinations**—everything a mechanic will need to handle **ninety-five per cent** of all jobs that come into a general repair shop.

The hardwood box has a place for each part, missing parts are revealed at a glance. The thorough way in which each individual socket and part is made and finished shows itself at once.

An Attractive Jobbing Item

From our experience of the past year we know there is a large market for H & G Wrench Sets of which there are two—the Universal Set and a special set for Ford cars.

Many live jobbers and dealers have already associated themselves with us in distributing these good tools. With increased factory capacity we can service several more. Our 1923 advertising and selling efforts will be larger and more intensive. You will like the way we do business

The Eastern Machine Screw Corporation

10-20 BARCLAY STREET, NEW HAVEN, CONN.

Select Your Compressor as You Would Hire a Workman



Your net profits depend upon your workmen and your equipment—

Do they put more dollars into your till than they take out of it?

For their mistakes, absence, sickness, laziness, stupidity or dishonesty—YOU pay.

Two workmen, at the same pay, may represent vastly different results on your books. Their wages are not the only measure of their value.

A compressor's wages are its price and upkeep. But what it actually costs you

depends upon the way it does its work, and how long it will *continuously* give full, trouble-free, satisfactory service.

A workman's best recommendation is his own past record. You would have to visit our factory, or read through our catalog, to see how a BRUNNER is made "for Twenty Years at Hard Labor."

But nearly any Jobber can tell you what it has *done* in the way of continuous, trouble-free performance.

*There is a BRUNNER representative near you—
A line from you to any of the following addresses,
will place him at your service.*

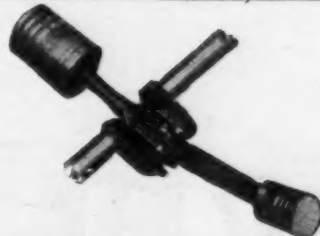
Brunner Mfg. Co., Utica, N. Y.

Cincinnati, O. Kansas City, Mo. San Francisco, Cal.
First Nat. Bk. Bldg. 1805 Grand Ave. 607 Santa Fe Bldg.

Model 939 Assembled Unit

No. 99 2-stage power plant, mounted on and completely piped for stationary installation; fully automatic. A faster working $\frac{3}{4}$ H.P. unit than has heretofore been obtainable. Pressure in tank sent from zero to 175 lbs. in less than 25 minutes.

Forked connecting rod assembly eliminating lateral momentum and destructive vibration. Note automobile type skirt pistons with 3 rings, found only in BRUNNER 2-stage construction.



BRUNNER
AIR COMPRESSORS

Good for Twenty

Years at Hard Labor

WELCO Foot Accelerator



\$1.50

Works Independently of the Throttle
—and is very easy to install

The need for an accelerator that works independently of the throttle, is easily installed, and sells at a price all Ford owners will pay, has long been felt.

Every dealer has known he could sell such an accelerator—if he could get one.

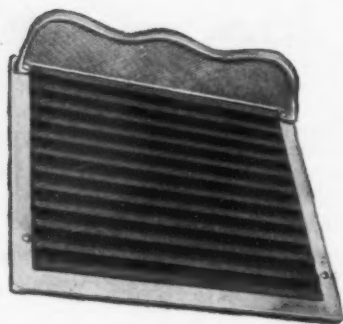
And in the new Welco Accelerator he has just what he has wanted. Anyone can install it. There is only one hole to drill in the floor board. The adjusting nut enables the owner to set it at any desired idling speed. It is rugged and long lasting. A foot rest goes with it. It is packed in an attractive carton, with full instructions enclosed.

And it sells for \$1.50.

Do you know a Ford owner who wouldn't pay so small a price for an accelerator having so many big advantages?

Jobbers and dealers will find this product a quick, profitable seller. Takes up little room, requires no service after installation, and because of its low price and great utility, is assured a quick turnover. Write today for discounts and full particulars.

WELKER MANUFACTURING CO.
 MIDDLETOWN, CONN.



WELCO STEP PLATE
 THE WELCO ALL - SIZE STEP PLATE fits any running board by simply moving the toe guard forward. Solid aluminum frame and toe guard. Highest quality rubber mat. Price complete, \$2.00.

WELCO Products

"MANZEL"

Hydraulic Shock Absorbers



Easily installed on all makes of cars.

A Real Opportunity for Distributors and Dealers

"Manzel" Shock Absorbers start where the ordinary shock absorbers end. They are not "just another way to do it," but an actual, definite step forward (the longest yet made) toward a really comfortable, smooth riding automobile.

They provide the sort of service one has a right to expect from really efficient shock absorbers. They hold the car steady, eliminate the rebound, permit greater speed on poor roads, make steering easier, and give a degree of comfort, known only to users of "Manzel" equipped cars.

There are many shock absorbers, but only one "Manzel." One ride in a car equipped with a set of "Manzels" will convince you of the big difference.

The "Manzel" offers a most unusual opportunity to Dealers and Distributors, and we have an interesting and profitable proposition for men or firms who can represent us in territory where we are not represented at present.

A "Manzel" Agency means good profits to the dealer or distributor, the best of satisfaction to the purchaser, and the full guarantee of an old established firm behind it.

*Write for Literature
and Full Information*

MANZEL BROTHERS COMPANY
306 BABCOCK STREET BUFFALO, N. Y.

(Also Manufacturers of the "Manzel" Engine Driven Tire Pump)

Leading Features

As their name implies, "Manzel" Shock Absorbers operate on the hydraulic principle, oil being used as the co-operating medium to cushion the shocks, and they embody the most efficient operation of such action yet produced.

Automatic valves, exclusive "Manzel" features, control the action according to the severity of the shocks, causing the car springs to expand, gently and smoothly, on a cushion of oil.

The entire mechanism is quick acting, operating instantaneously and effectively to check the rebounds, no matter how often they occur, or how closely they follow one another.

They do not interfere with the normal compression of the springs, but co-operate with the springs to check the rebound.

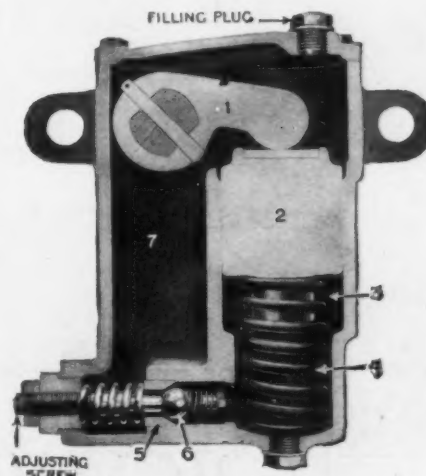
The valve action may be regulated to suit the weight of any car, by means of the adjusting screw.

All working parts are immersed in oil and are self-lubricating, free from wear, and noiseless in action.

They are distinctly different from all other shock absorbers and mark one of the greatest forward strides toward the perfect riding automobile that has been made in many years.

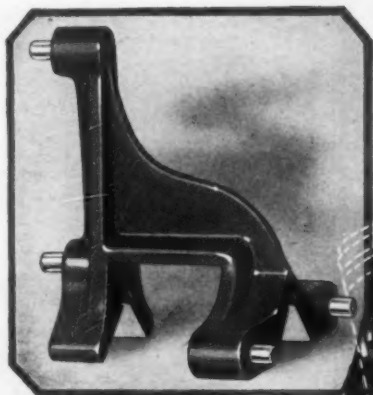
"Manzel" Hydraulic Shock Absorbers are quality accessories, that will improve the riding qualities of the finest cars, yet are sold at a price to meet the purse of the average car owner.

Automatic valves (5 & 6) control the action according to the severity of the shocks, allowing the car springs to expand, easily and smoothly, back to their normal position on a cushion of oil.



"THE BEST EQUIPPED SHOP GETS THE BUSINESS"

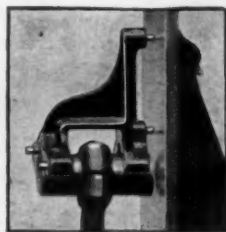
Correct *Every* Misalignment on Stevens *Improved* Piston Aligner



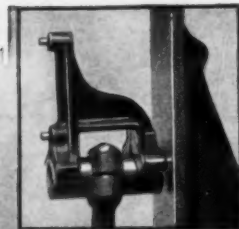
This exclusive "sea lion" indicator (which is included with the Aligner) is placed on the wrist pin to detect any twist or bend in the connecting rod. The assembled piston is then tilted against the machined surface for final check.

List at \$22.50

with one arbor.
Ground arbors are
obtainable in all
sizes.



This shows the "sea lion" indicator checking the connecting rod for bend.



Here the "sea lion" indicator is testing the connecting rod for twist.

Note the convenient clamp for quick change or adjustment of arbor.



THE improvements embodied in this new model of STEVENS PISTON ALIGNER reflect the purpose of Stevens SPEED-UP Tools—to offer the most practical tool not only for speeding up a job, but also for obtaining greater accuracy. The entire line of 90 special tools is equally effective in helping a shop to give greater satisfaction to the car owner, and also of making more profit on a job. Ask your jobber for the new STEVENS PISTON ALIGNER with the "sea lion" indicator—AND WRITE DIRECT TO US

• FOR CATALOG 105 MA.

STEVENS & COMPANY

375 BROADWAY

NEW YORK

90 Special Tools—Each Fits a Job

Stevens **SPEED UP** **Tools**

TRADE MARK

Announcing R A S REID AIR SPRINGS

FLOAT THE  CAR ON AIR

*N*ow we are ready to offer to distributors and dealers a proposition which, we honestly believe, is without peer as a money maker—especially since it involves no large financial burden.

We offer an “exclusive territory” arrangement for the sale of Reid Air Springs.

The beauty of these brightly nickeled air springs and the look of distinction and class that they give to the car—are business getting factors that force themselves on the attention of motorists.

And the fact that they virtually float the car on air—softly and resiliently absorbing the road jolts—and this without instability or any tendency to tip at turns—means sales—big sales. We know this from our broad experience.

But the important thing to the Dealer is this—he can install these Air Springs himself in his own shop at a far lower cost than similar devices and it isn't necessary to drill or cut the frame to do it. That's a clincher.

On the next page
we say why



Why they give to the car a velvety smooth riding quality

The Reid Air Spring consists of three main parts—(1) An air and oil chamber which is really an outer housing and which is attached to the car frame. (2) A main piston which functions in the housing with a 3½ inch stroke, and (3) another piston which functions in the main piston with a 2 inch stroke and

which is attached to the spring of the car.

The main piston works against air pressure and is oil sealed, absorbing road shocks as they should be absorbed with no unstable lurching.

They respond instantly and yet the movement is no

sooner started than it is dampened and tapered off.

The device, tho amazingly simple and positive, provides a smooth, joltless riding quality to the car regardless of road bumps or hollows. Once filled with oil, it is self lubricating and needs no attention for at least one year.

Why they do not affect the car's stability

Although instantly responsive to road obstructions and depressions, the Reid Air Springs give the car no tendency to upset at turns, because the action of the pistons both on expansion

and compression strokes is instantly snubbed. Furthermore, the pistons have ample bearing surfaces which insure long wear and prevents looseness and side sway.

Why they are easy to install

Installation of the frame bracket is simply a matter of removing the horn from the end of the car frame and inserting and fixing in its place a corresponding lug which is part of the bracket.

Original rivets must be taken out and new rivets set. That is all.

The attachment to car spring means only taking out the shackle bolt and putting it back again.

Why they can be sold for a wider range of cars

Reid Air Springs are more universal because they can be applied to virtually all makes of cars.

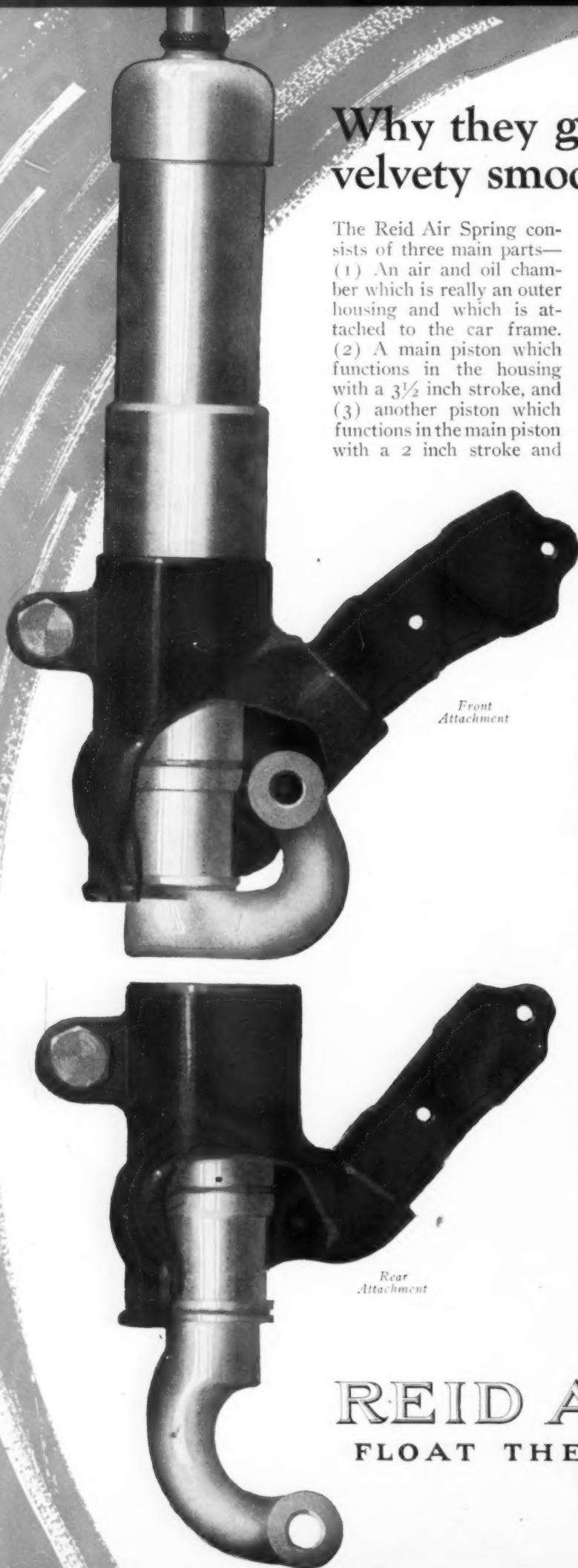
Besides all this they are priced so that the dealer makes a real profit on each sale.

These reasons plus the low price give Reid Air Springs tremendous sales possibilities.

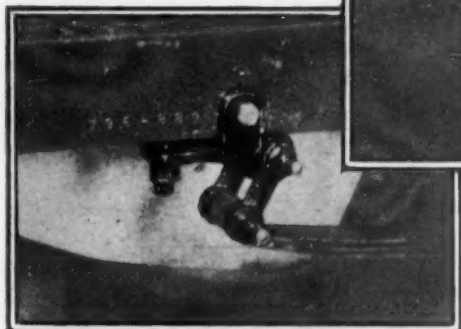
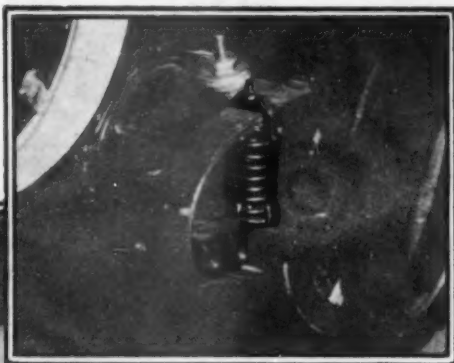
This attractive proposition is open to live distributors and dealers—it will pay you to write or wire for complete details at once.

REID AIR SPRING CO., NEW HAVEN, CONN.

REID AIR SPRINGS
FLOAT THE  CAR ON AIR



We will replace any spring that breaks within
a year *while*
equipped with a
Giant Shock Ab-
sorber.

Rear
View

Front View

THE best springs break—under certain conditions. A sudden, severe shock or extreme jar—an unseen hole in the road—snaps the springs. The terrific rebound does it. Absorb the shock—the jar—the rebound—distribute all this and also ordinary vibration through a sturdy, durable coil spring that fits between the spring ends—and the effect is like riding on a cushion of air.

In fact, the Giant Shock Absorber made especially for Dodge Brothers cars, absorbs the shocks—the jars—the rebounds—so thoroughly that we are able to guarantee the owner or user that if a spring breaks within a year from date of installation of Giant Shock Absorber—**WE WILL REPLACE THAT SPRING.**

This guarantee is your money-maker. And what is more—the Giant permits you to guarantee perfect ease of riding and a driving satisfaction that knows no competition. Every Dodge Brothers car owner is a prospect.

Made of the best grade of malleable iron—all fittings in unison with fittings of the car. Nothing to rattle—get loose—mar the beauty of the car. Nothing to hamper the installation of bumpers. The Giant bolts firmly to the springs and can be installed in an hour.

Car owners using the Giant Shock Absorber frankly say it does more than we claim for it. Its price is right—\$22.50—with an exceptional discount to the dealer. Write or wire us at once. Get a set—install it—see the difference—and you'll sell many and many of them. Let's get started today—now.



\$22.50

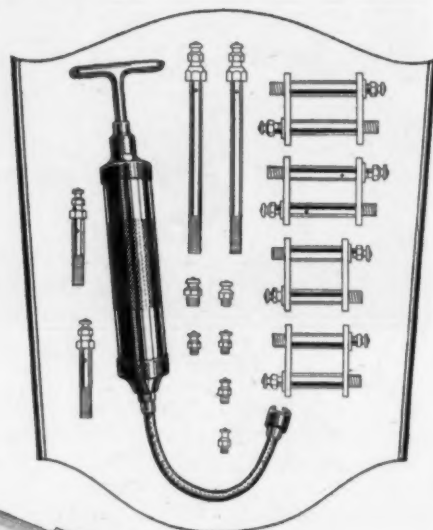
a set

Made especially
for the **DODGE**
BROTHERS car

RED GIANT TOOL CORPORATION, Lynchburg, Va.

THE ROSE HIGH PRESSURE LUBRICATING SYSTEM

for Every Ford



Get the Sales!

The Rose Pressure Lubricating System for Fords, at \$8.64, is bringing a great volume of business to profit-wise dealers.

This outfit includes Pressure Gun, Shackles, Tie Rods, Steering Bolts and all other fittings, ready to install.

Ford Owners are already sold on the pressure lubrication idea. The Rose price fits their pocket-books and has brought down an avalanche of sales. Get your share.

The Rose is a quality article; carefully made, tested under one ton pressure with light oil.

When making a sale, never forget to explain the chief Rose feature—it is the only pressure lubricator that Fills by Its Own Suction. No filling devices have to be used.


Profit by this great demand. Stock from your jobber. Write us for sales literature and displays. Get the sales.



Sheer merit has made the Rose the fastest selling tire pump in America. Practically every dealer in the United States carries it exclusively. The Rose Lubricator is rising to the same position. You will never make a mistake if you stock popular goods. There's profit in them.

List \$ 8.64

FRANK ROSE MFG. CO.
HASTINGS, NEBR.



29 Years of Tire Building Experience —

KOKOMO TIRES have been on the market for twenty-nine years. The first automobile ever built in America was equipped with Kokomo pneumatic tires nearly three decades ago—and those tires will hold air yet!

THE DEALER who handles Kokomo Tires has this long and honorable record to support him; the *first* tires on the market, and the *best* tires on the market today.

KOKOMO TIRES are to be had in a complete line of sizes, both in cords and fabrics. Kokomo stores are the leading tire stores, wherever found, and Kokomo dealers are universally successful dealers.

WRITE TODAY for full information about the pioneer tire, and how our dealers are cashing in on this high class, fast moving line.

*Means
Something*

KOKOMO RUBBER CO., KOKOMO, IND.

LONG ~ LIFE
Kokomo
TIRES AND TUBES

The Kingston LINE FOR 1923

BELOW WE SHOW a horizontal type single adjustment Carburetor (Kingston DeLux Model, with Kingston Steering Column Control and New Fuel Strainer. This is the new and greatly improved model for Ford cars and trucks, and will undoubtedly prove exceedingly popular during the year. This new model is not only made with the utmost care, and (as always with Kingston products) of the best material obtainable, but presents an exceptionally handsome appearance. It is constructed throughout of brass, highly polished and sells on sight. It affords the driver of the Ford car a high class carburetor, capable, because of the Steering Column Control, of the most delicate adjustment, at an attractively low price. It will prove a big leader for every dealer.



The new all Brass Ford Model, Complete with Strainer and Steering Column Control. Ready to install.

IN THE PICTURE BELOW is shown the New Kingston two-adjustment Model L5-D Carburetor, vertical type, with Kingston Steering Column Control and special compact type Fuel Strainer. This is one of the handsomest and best made carburetors that has borne the Kingston name. It is all brass construction, has High Speed and Low Speed adjustment, with the added advantage of instant needle valve control from the steering column. We have never offered the trade a better valve. Speed, power and economy tests show it to be in a class by itself. Its fine appearance makes it a ready seller, and the binding Kingston guarantee means a satisfied customer in every instance. The model shown below is for the Chevrolet car, and is now ready for the trade.



The New all Brass Chevrolet Model, Complete with Strainer and Steering Column Control. Ready to install.

THE FOLLOWING KINGSTON MODELS ARE NOW READY FOR THE TRADE

(All Brass; Equipped with Fuel Strainer and Steering Column Control)

Ford, \$6.50; Maxwell, \$15.00; Chevrolet, \$15.00; Overland, \$15.00; Dort, \$15.00; Dodge, \$15.00; Studebaker, \$16.50; Haynes, \$20.00; and many other popular priced cars.

BYRNE, KINGSTON & CO., KOKOMO, IND.

BRANCHES:

New York, 243 West 55th Street
Chicago, 1430 Michigan Avenue

Detroit, 4610 Woodward Avenue
Boston, 15 Jersey Street

MECHANICAL  PERFECTION

"By Night as Well as by Day"

The DUNHAMETER

The Engine Guardian

maintains its vigil over the temperature of the engine.

When the engine reaches its efficient operating temperature a green light appears and continues evident as long as the engine runs safely. When too high a temperature is reached—endangering the motor and reducing its efficiency—the green shutter is replaced by RED which instantly catches the eye and gives ample warning. "By Night as Well as by Day."

When the temperature of the engine is below operating efficiency there is no light.

"Classic" Model

The "Classic" model Dunhameter pictured below is a fitting ornament for America's finest cars. The simple tip back feature permits easy filling of the radiator.

The green jewel on the eagle's breast serves also as a dependable parking light.

It is THEFT-PROOF. Installation is simple.

We have an attractive proposition for dealers in cars and accessories.

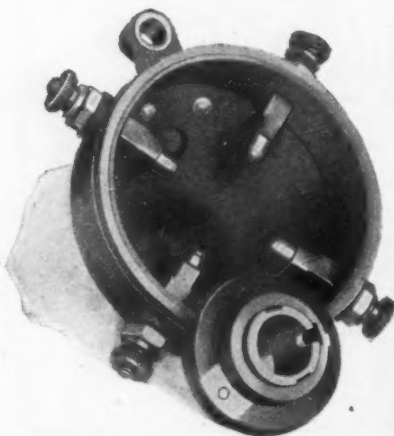
THE DUNHAMETER CORPORATION

230 East Ohio Street,
Chicago, Illinois



ECLIPSE SPECIALTIES

Every One a Necessity—Quick Turn Over and Good Profits



Eclipse Oil-less Timer

THE timer that is ROLLER-LESS, OIL-LESS and RENEWABLE. Different than all other timers. The timer that can't fail because of congealed oil or gummed-up contacts—will not miss-fire because of bumpy "hill and valley" wear as in roller-type timers. Built mechanically right—a construction that insures dry wipe-contact action—perfect timing—miss-less performance. And what is more, it's renewable. After a long service life—longer than the average timer—you reap a continual harvest on replacement profits in addition to the original liberal profit margin on the timer itself. List price.....

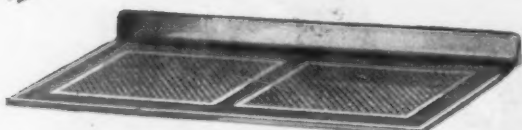
\$1.50



Eclipse Choke-hold

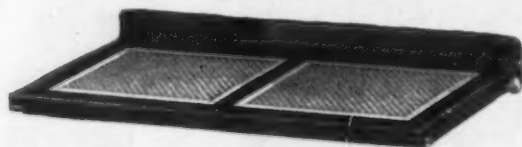
HERE'S the real rapid-fire seller for Fords. No Ford should be without one. A winter necessity. Keeps the choke rod where you set it till the motor is warmed up. Saves frequent restarting in cold weather. Saves costly battery current. Quickly and easily installed. One of the snappiest sellers of all Eclipse products. One of those little things that brings a big yearly profit on your investment. It's quick salability will surprise you. Lists at.....

50c



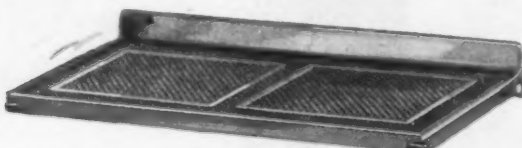
ALL aluminum auto step to match above design. Per pair.....

\$8.00



COMBINATION luggage carrier and auto step. Same design as above carrier but made with black enameled cast iron frame and aluminum stepping plates. Per pair.....

\$10.00



COMBINATION luggage carrier and auto step. All aluminum—neat and clean cut in design. For ALL makes of cars. Per pair.....

\$15.00

Eclipse Timer

Replacement Contacts



FOUR new contacts that can quickly be slipped into the old timer shell. Then the Eclipse is good as new again. Replacement profits come without selling effort. Your Eclipse Counter Display Card sells 'em. They're bought right off the card. The greater your timer sales, the greater your replacement profits. And there's an extra liberal margin in replacements. List price, per set.....

25c

Brush and Contacts



SOME Eclipse Timer owners want a new brush as well as new contacts. Here they are—COMPLETE replacements—in the little cartons. Counter Display No. 10. More easy sales and MORE profits. List price.....

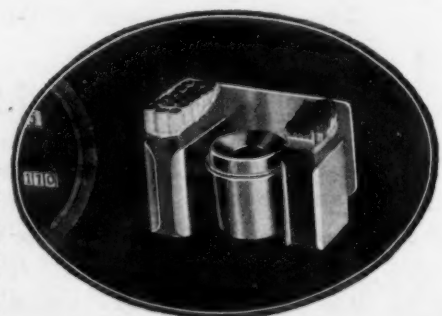
50c

Eclipse Auto Smoke-Tray

SAFETY first! Why run the risk of "climbing a pole," while fishing in your pockets for smoking material with one hand and trying to drive with the other. Put this good-looking, serviceable

Eclipse Smoke-Tray on your dash and save inconvenience—possibly serious accident. Cigarettes, cigars, matches—all right within reach from the wheel. A good seller at.....

\$1.50



Kaufman's Carry-All Auto Step

ELIMINATES the cumbersome ungainly, seldom-used luggage carrier. A handsome looking auto step that is instantly converted into a luggage carrier. Raise the step—"presto - change!" One move and it's done. Sturdy and rattleless. Made in two styles with plain steps of similar design for opposite side of car. Made to fit all size running boards. Priced from.....

\$4 each to \$15 pair



AN all aluminum single step. Same design as above. For use where smaller step is preferred. Per pair.....

\$4.00

LIBERAL DISCOUNTS FROM THESE PRICES
DEALER LITERATURE SUPPLIED
JOBBER and DEALERS: WRITE FOR LITERATURE

ECLIPSE TIMER MFG. CO., 2909 Meinecke Ave., MILWAUKEE, WIS.

Announcement

*to automobile
dealers everywhere*

**GET THE BIFLEX NEW
PROPOSITION!**



Biflex

Spring Bumper



TRADE MARK

Don't act on any bumper proposition until you learn what Biflex offers you. Decide that point now—and don't let yourself be persuaded by "alluring" propositions of glittering profits that may not materialize.

Biflex Distributors are now prepared to allot dealers their supply of Biflex Bumpers for the coming season.

Be sure to make arrangements NOW for your stock of Biflex Bumpers.

As a result of Biflex Quality combined with the powerful national advertising campaign on Biflex Bumpers, the demand is so great, that delayed orders may cause disappointment, both to yourself and customers.

Don't disappoint your customers — they want Biflex on their cars, because they

know it's the Bumper that provides Protection With Distinction.

Take advantage of this opportunity to make big money on Biflex instead of having to make excuses to your customers.

Remember this: Biflex national leadership has no substitute. Biflex, the original, is first in the minds of motorists, and Biflex leadership is growing more pronounced, day by day.

Get the Biflex proposition before you close any bumper deal. Write us for name of Biflex jobber in your territory.

BIFLEX PRODUCTS COMPANY

Waukegan, Illinois

PROTECTION WITH DISTINCTION

ECLIPSE SPECIALTIES

Every One a Necessity—Quick Turn Over and Good Profits



Eclipse Oil-less Timer

THE timer that is ROLLER-LESS, OIL-LESS and RENEWABLE. Different than all other timers. The timer that can't fail because of congealed oil or gummed-up contacts—will not miss-fire because of bumpy "hill and valley" wear as in roller-type timers. Built mechanically right—a construction that insures dry wipe-contact action—perfect timing—miss-less performance. And what is more, it's renewable. After a long service life—longer than the average timer—you reap a continual harvest on replacement profits in addition to the original liberal profit margin on the timer itself. List price

..... **\$1.50**



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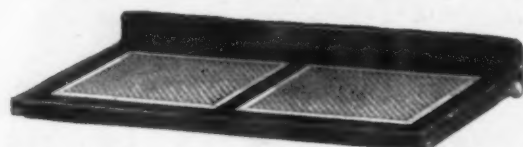
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..... **50c**



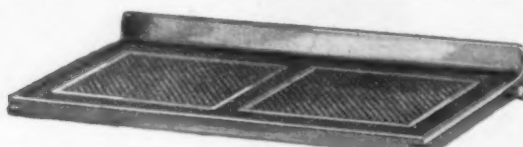
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..... **\$8.00**



COMBINATION luggage carrier and auto step. Same design as above carrier but made with black enameled cast iron frame and aluminum stepping plates. Per pair

..... **\$10.00**



COMBINATION luggage carrier and auto step. All aluminum—neat and clean cut in design. For ALL makes of cars. Per pair

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..... **25c**

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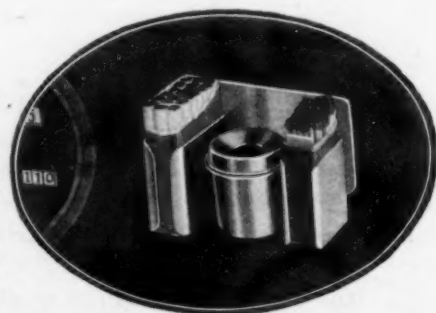
..... **50c**

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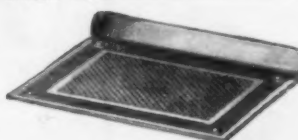
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\$4 each to \$15 pair



AN all aluminum single step. Same design as above. For use where smaller step is preferred. Per pair

..... **\$4.00**

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*to automobile ~
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Don't act on any bumper proposition until you learn what Biflex offers you. Decide that point now—and don't let yourself be persuaded by "alluring" propositions of glittering profits that may not materialize.

Biflex Distributors are now prepared to allot dealers their supply of Biflex Bumpers for the coming season.

Be sure to make arrangements NOW for your stock of Biflex Bumpers.

As a result of Biflex Quality combined with the powerful national advertising campaign on Biflex Bumpers, the demand is so great, that delayed orders may cause disappointment, both to yourself and customers.

Don't disappoint your customers — they want Biflex on their cars, because they

know it's the Bumper that provides Protection With Distinction.

Take advantage of this opportunity to make big money on Biflex instead of having to make excuses to your customers.

Remember this: Biflex national leadership has no substitute. Biflex, the original, is first in the minds of motorists, and Biflex leadership is growing more pronounced, day by day.

Get the Biflex proposition before you close any bumper deal. Write us for name of Biflex jobber in your territory.

BIFLEX PRODUCTS COMPANY
Waukegan, Illinois

PROTECTION WITH DISTINCTION

ALEMITE

High pressure lubricating system



Interior of Davis-Godley-Wilson Tire Co. Store. Note Alemite Cabinet in center of counter. Circle: Alemite "H-15" Portable Compressor in use at their lubricating rack

"Alemite Cabinet Increased Our Sales 400% in Six Weeks"

"SIX weeks ago we put an Alemite Cabinet on the counter and displayed several Alemite posters in the window. Since then our sales have jumped 400%," writes the Davis-Godley-Wilson Tire Co., of Kansas City.

Link your place of business with our tested selling plan, go after the Alemite business in your locality and you, too, will get quicker turnovers and make more money.

With the Alemite Cabinet, the Alemite Equipment Manual and a small invest-

ment in stock you can easily and quickly sell an Alemite System for any make of car or truck.

The attention-getting Cabinet will also help you share in the steady and profitable replacement business coming from the three million cars already Alemite-equipped.

Alemite Lubricant and Alemite Lubricating Spring Covers are two other nationally advertised, fast selling products included in the Alemite Proposition. Dealers, write today for full details!

A Product of

THE BASSICK MANUFACTURING COMPANY

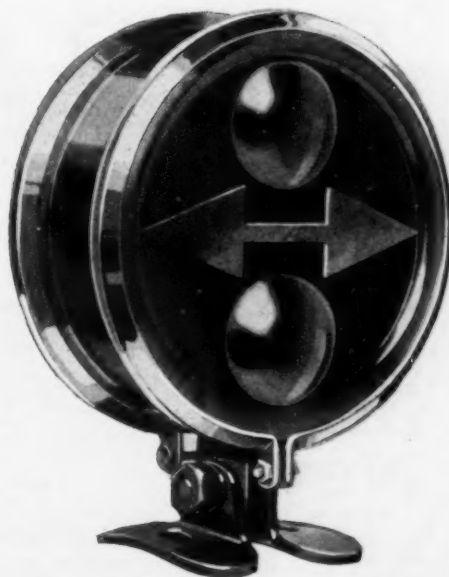
2662 North Crawford Avenue, Chicago, Illinois
Alemite Products Co. of Canada, Ltd., Belleville, Ontario

Demonstrate --and "Ask 'em to Buy"

We believe in the "Ask 'em to Buy" idea. Apply it to your business if you have not already done so. It provides you with a wide open opportunity to develop sales in many cases where it would never occur to the motorist to purchase additional equipment for his car.

Display your merchandise. Use your windows. Observe the equipment already on every car that pulls up in front of your place of business and then make your suggestion—"Ask 'em to Buy."

And don't fail to demonstrate. Very often the motorist will do this himself if given the opportunity. The Arrow-Lite demonstrator, illustrated below, is compact and attractive in appearance. It takes up little space on your counter and literally invites attention. It will readily develop Arrow-Lite sales if you will put it to work for you. The coupon below will bring you the facts.



The STOVER ARROW-LITE

"The Signal with the Green Running Light"

Designed to meet every possible signalling requirement—starting, running, stopping, parking and turning left and right—the Stover Arrow-Lite was conceived and is being built to provide both manufacturer and motorist with the utmost in safety precaution. *****Both automatic and semi-automatic in action, and with its fundamental idea as applied to motor cars, fully protected by patents, it is without question the ultimate rear-end signal. Motorists, dealers, jobbers and manufacturers appreciating its double-duty purpose—a green light while running which automatically flashes to red when stopping—have enthusiastically accepted it.

This is your opportunity. Get in touch with your jobber and order a small stock of Stover Arrow-Lites and be ready to meet the ever-increasing demand for this better signal.

The Stover Line of signals also includes the Stover Stop Light and the Stover Combination Stop and Parking light—both, exceptionally well built and distinctive in design.

The Stover Signal Engineering Co.,
Racine, Wisconsin

Mail This for the Facts in Full!

The Stover Signal Engineering Co.,
Racine, Wisconsin

Gentlemen: I want full information about Stover Signals and the Stover selling plan. My jobber's name

is

My name is

Address City



The New R&V Knight Six

**Sold and
Serviced
in a
New
Way**



The Latest Achievement in Knight Engines

The only type of engine built for automobile requirements exclusively

Basically there are only two kinds of gasoline automobiles you can buy. There are only two kinds that a manufacturer can build. You must choose—he must choose—between a poppet valve motor and a Knight engine as the power plant of the car. This choice is the most important of all—for the engine is the heart of the car

**And
Now—**

1 Our Factory

The decision which confronted us in 1913—which has confronted Daimler, Mercedes, Minerva, Panhard in the past and lately such builders as Voisin, Peugeot and other great manufacturers of Europe—confronts you if you intelligently study your interests.

Will your new car be motored by a poppet valve or Knight engine? There is no other issue. Decide between Knight and poppet valve first—then choose the make.

Buy From the Dealer Who Serves You Best

You can now choose the man from whom you buy as freely as you choose the car itself, and assure yourself of the close personal interest which not only humanizes business relations and makes friction improbable, but will bring to you convenience of location of that service.

This plan is made possible because the day when satisfaction to the driver depended upon frequent attention from specialized experts for readjustments of engine parts, valve tinkering or carbon trouble has for the buyers of the new R&V Knight Six passed into history.

To help you in your decision between the Knight and poppet valve engine fill out the coupon attached and we will mail you a copy of our book "Why We Believe in the Knight Engine."

R & V MOTOR COMPANY, East Moline, Ill.

MAIL THIS REQUEST FOR INFORMATION TODAY

R & V MOTOR COMPANY, East Moline, Ill.

Gentlemen: Please send me full information on the R&V Knight Six engine, sealed and guaranteed for two years. Also send me your book, "Why We Believe in the Knight Engine."

I am interested in the type of car below:

Sport [4 pass.] Touring Car [5 or 7 pass.] Club Sedan [5 pass.] Sedan [7 pass.]

Signed _____

Address _____ City _____ State _____

The Sealed and Guaranteed Engine

Our product leaves our factory only after extraordinary care has been taken to make it right. Our engines are banded and sealed and cannot be in any way worked upon unless our seal is broken.

Should an unexpected adjustment or repair be necessary within two years from date of purchase, our guarantee puts every expense on us. This remarkable guarantee is only possible because of our remarkable engine.

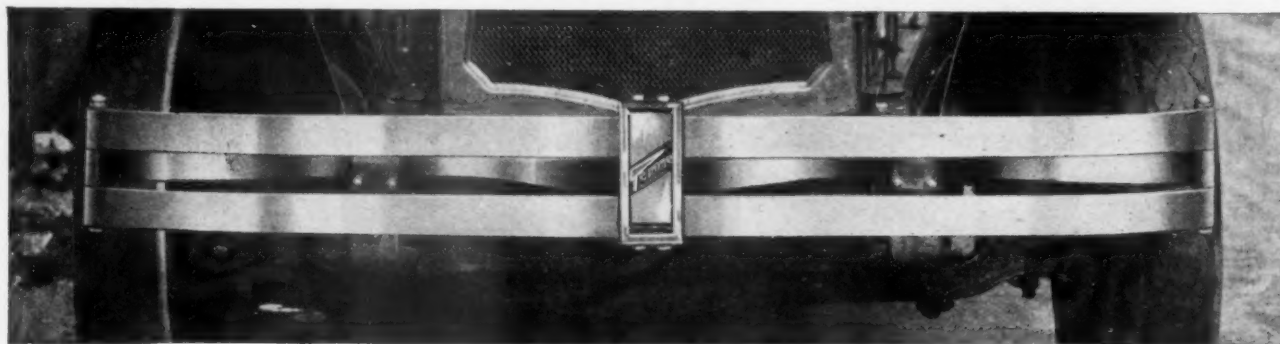
Dealers

Dealers are equally protected by our guarantee, as service expenses are to them at least eliminated. The opportunity to gain satisfied customers with profit and good will is given dealers by our new plan, which they should investigate

3 You

**Engine
Sealed and
Guaranteed
for Two Years**

"EVERLASTING PERFORMANCE"



It's A **Temme** Bumper

30 Percent Lighter Than Average
50 Percent More Contact Surface
100 Percent Resilient

Sales of this new **Temme** Bumper are already taxing our production. To see it is to want it. Jobbers, dealers and users all feel the same way about it.

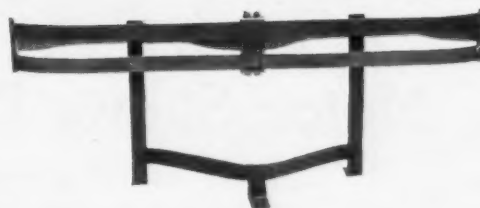
So you had best get a stock of them before a waiting list is started.

The sale of **Temme** Bumpers is simplified by using our new display stand. Mount a **Temme** bumper on it. Move it right against the front of a car. It shows the buyer just how it will look on his own car. And it gives the best possible chance to put over every sales-feature.

Tough, resilient **Temme**-analysis spring steel throughout. Every cubic inch is bumper. No dead metal anywhere. The spring steel is doubly heat-treated and oil-tempered, making it elastic as a Toledo sword-blade. The brackets are hand-forged of **Temme** spring steel. Installation is a few minutes' fun for a mechanic. Your, or your car's name on the center plate.

Mail the coupon for the offer that includes our sales-making display stand.

Temme Spring Corporation
55-57-59-61-63-65-67 E. 28th St.,
Chicago, Ill.

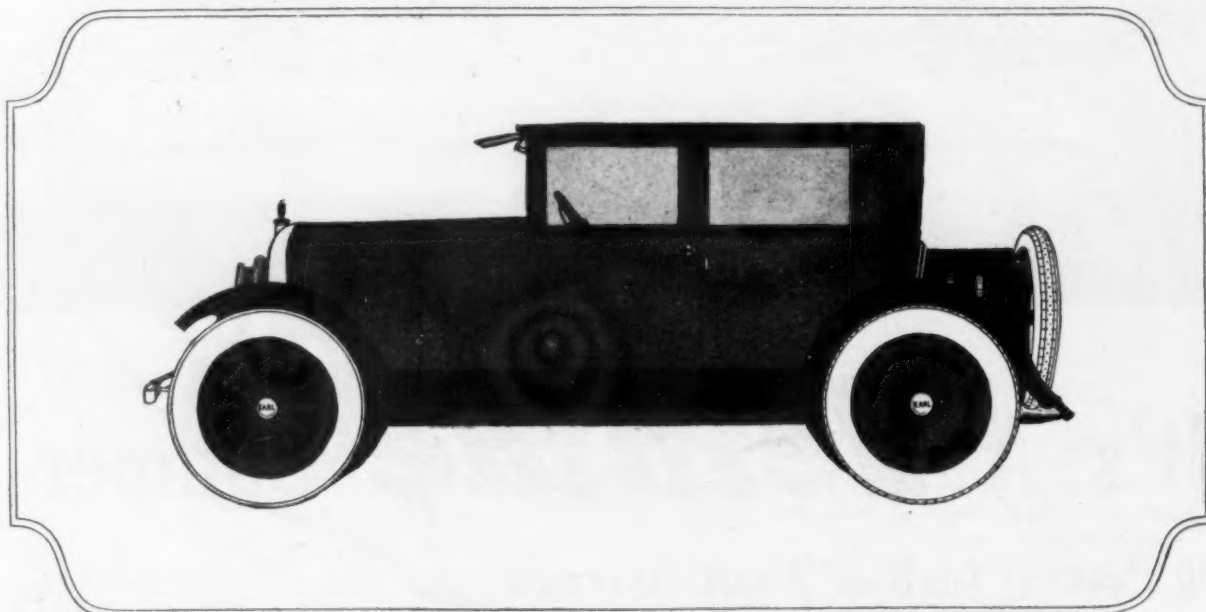


Get This
Display Stand Free

**Temme Spring Corp., 55-67 E. 28th St.,
Chicago, Ill.**

I want some of the bumper profits that are so easy to get with the display stand you offer. Please tell me about it. My jobber's name and address are

Name _____
Address _____
City _____ State _____



EARL CABRIOLE, \$1395, WITH TRUNK, BUMPER, MOTOMETER AND COMPLETE EQUIPMENT

Motor Shows Demonstrate EARL Value

Quality and style proved by comparison
of coach work, finish and full equipment.

At each Automobile Show, the appeal of the great Earl line to dealers and owners becomes plainer and plainer.

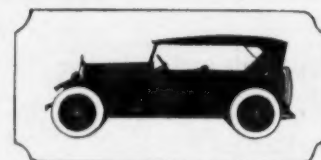
The public has its own ways of checking style and quality claims. And the Earl cars and the cut-out chassis are triumphantly passing every test proposed for them.

At \$1095, the Earl Touring car has no equal in its price range for smart lines and perfection of finish and appointments. Complete equipment adds further value.

Its low, sweeping body lines are emphasized by the clean cut top of first grade fabric, whipcord-lined. Its instrument board and garnish rail of walnut and genuine leather upholstery are convincing evidence of its unusual quality.

Even in lesser details, the Earl cars duplicate features of much higher-priced cars. Slip-proof rubber facings on pedals, tonneau carpets with heavy tape bindings, left-hand ignition and dimmer switch are only a few of these.

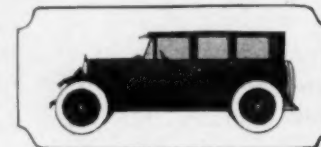
At \$1395, the roomy luxury, dignity and complete equipment of the Earl Cabriolet for five made a deep impression. This was shared by the Custom Roadster at \$1485, and the Brougham and Sedan at \$1595. See the Earl cars at the Cleveland and Chicago Shows. Write or wire today to Jackson for full information about the complete Earl line, the big Earl territories and our liberal dealer contract.



Earl Touring Car \$1095
fully equipped



Custom Roadster \$1485
unusual equipment



Earl Sedan \$1595
with complete equipment

Touring Car	\$1095
Custom Roadster	1485
Cabriolet	1395
Brougham	1595
Sedan	1595

Prices f. o. b. Jackson

Earl Motors, Inc.

Jackson, Michigan

*The right car, at the right
price, with the right dealer
discount.*



*Write or wire today for cata-
log, terms and list of open
territories.*

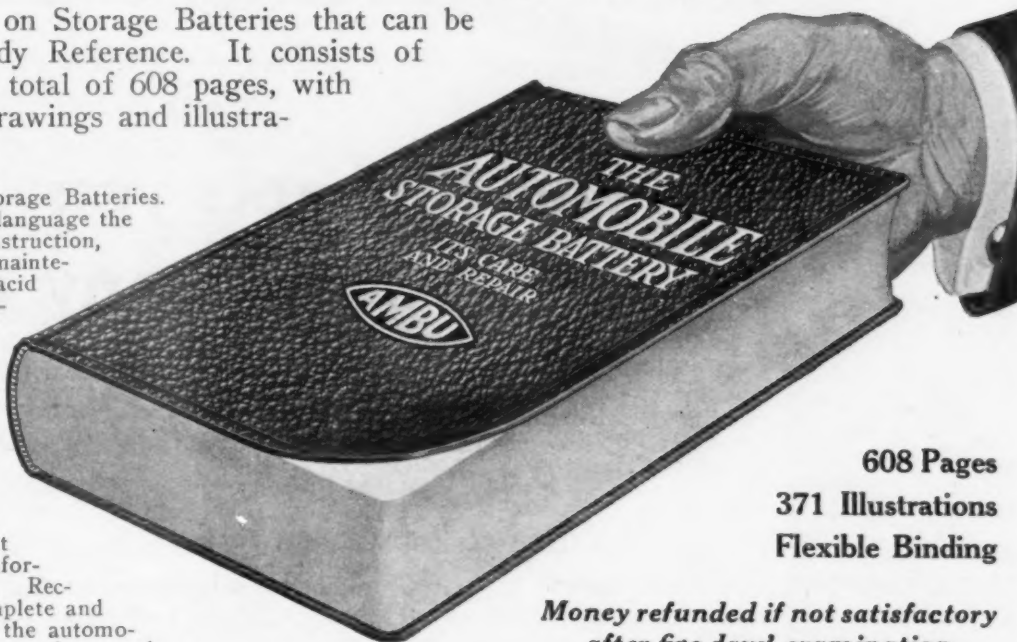
Announcing the Third Printing

of the Original and

Most Practical Hand Book Ever Written on Storage Batteries

THE First Book on Storage Batteries that can be used as a Ready Reference. It consists of twenty chapters—a total of 608 pages, with 371 photographs, drawings and illustrations.

A Practical Book on Storage Batteries. Gives in a non-technical language the working principles, construction, operation, manufacture, maintenance and repair of lead-acid batteries used on automobiles, farm lighting and radio equipment. Describes, at length, all subjects which will help any man build up a successful battery repair business. Will help solve all battery difficulties. Prepared so that it can be used as instant reference for specific information on difficult jobs. Recognized as the most complete and authoritative treatise on the automobile battery that has ever been published.



608 Pages

371 Illustrations

Flexible Binding

*Money refunded if not satisfactory
after five days' examination*

**RECOMMENDED BY ALL LEADING AUTHORITIES,
including such men as—**

Geo. M. Howard,
Dept. of Development and Design,
Electric Storage Battery Co. (Exide),
Philadelphia, Pa.
H. A. Harvey, Sales Mgr.,
U. S. Light & Heat Corp.,
Niagara Falls, N. Y.
Lawrence J. Pearson, Engineer,
Philadelphia Storage Battery Co.,
Philadelphia, Pa.
F. S. Armstrong, Sales Mgr.,
Vesta Battery Corp.,
Chicago.
Harry S. Bentley, Sales Mgr.,
The Prest-O-Lite Co., Inc.,
New York, N. Y.
E. B. Welsh, Adv. Mgr.,
Westinghouse Union Battery Co.,
Swissvale, Pa.
Raymond L. McFarland,
Dept. of Trades & Industries,
Iowa State College.

OVER 35,000 SOLD

The book was written to fill the need for a complete treatise on the automobile storage battery for the use of any man interested in storage batteries. The rapid sale of the first and second printings, and the letters of appreciation from those who have read it, proved that such a need existed.

This Third Printing has been entirely revised and re-written, and covers the improved methods in repairing and servicing storage batteries.

There are countless suggestions and ideas on such subjects as the manufacture of batteries, battery charging, lead burning, testing and examination of incoming batteries, battery overhauling, and battery shop business methods. Gives numerous short-cuts, and supplies information that may be worth hundreds, perhaps thousands, of dollars, to a man in a year's time.

It is 608 Pages of ready-to-use valuable information. Printed on the best quality enameled stock which brings the 371 illustrations out in exact detail.

This book full of pages of worthwhile cashable information cannot be described in this advertisement. You can only judge by reading and using it. If it is not all you think it should be, your money will be refunded if the book is returned within five days. Price delivered, only \$5.00.

Published by the

American Bureau of Engineering, Inc.

Manufacturers of  Battery Service Equipment

2634-6 Prairie Avenue

CHICAGO, ILLINOIS

"The Best Equipped Shop Gets the Business"

The best battery service equipment carries the AMBU trademark and is distributed by leading jobbers selected for their ability to serve.

Send for FREE catalog of AMBU Equipment and name of your nearest jobber. Address Dept. MA-1.

**Order From Your Jobber or Just Send
This Coupon Today**



Date.....

2634-6 Prairie Avenue
Chicago, Ill.

Gentlemen:
Please send the big new edition of "The Automobile Storage Battery" Book. I will deposit with postman \$5.00 on delivery and if I decide within five days not to keep it, my money will be refunded.

Name

Street

Town..... State.....

☐ Also send FREE CATALOG of AMBU Battery Service Equipment and name of nearest jobber.

Bearing Scraper**No. 382****Price, \$1.00**

This tool has a cutting
edge of $3\frac{1}{4}$ inches. Length
over all, 11 inches.



“This tool gets you out of many a scrape”

“That is what this Goodell-Pratt Bearing Scraper is noted for,” says Mr. Punch. “With a poor scraper it’s scrape, scrape, scrape—and scrape again. But here you have the properly shaped cutting edge that gives a smooth, easy cut.”

The Goodell-Pratt Bearing Scraper is forged from a high-grade tool steel and is correctly hardened and tempered. When the hard edge becomes dull, it can easily be sharpened on an oil stone.

The large hardwood handle and polished round shanks make this bearing scraper might comfortable to use. Handle it and you will think it was made to fit your hand.

Work done with this and other Goodell-Pratt Good Tools will mean more business for your shop. A reputation for good work spreads rapidly. Goodell-Pratt Tools help you do good work.

There are other tools you will need for adjusting and repairing automobiles. A word from you will bring, *without obligation on your part*, complete information concerning our line of motor tools. Write us today.



GOODELL-PRATT COMPANY

Toolsmiths

Greenfield, Mass., U. S. A.

GOODELL-PRATT

1500 GOOD TOOLS

In selling batteries, it speeds the sale to be able to sell the name *Prest-O-Lite* with them. A name almost as old as the automobile itself, it made the word *Service* known to automobilists. It is a name that guaran-

tees *Prest-O-Plates* in the battery, and *Prest-O-Plates* guarantee the best, all-around, all-weather battery.

To Dealers: Are you making money? Many *Prest-O-Lite* Battery Distributors have our valuable gas and appliance franchise—*TWO* profitable lines. Write us for particulars.

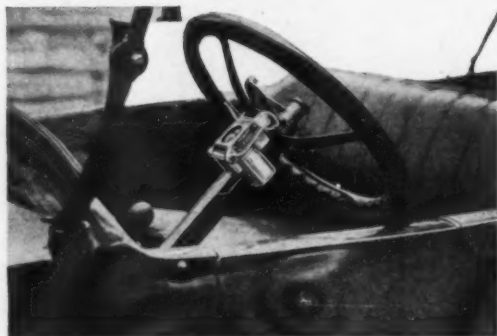
THE PREST-O-LITE COMPANY, Inc.
Indianapolis, Ind.

New York Office: 30 East 42nd Street
Pacific Coast Office and Factory: 599 Eighth St., San Francisco
In Canada: Prest-O-Lite Company of Canada, Ltd., Toronto

Oldest service to motorists



1413 ALLANTYN CT



The ReaLock Disappoints Crooks Only

Dealers and users declare themselves perfectly satisfied with **ReaLock**. Dealers because of the profits and ease of installation; users because of the protection. Perfect satisfaction means fast, easy sales, and lots of mouth-to-mouth advertising.

ReaLock cannot go into engagement unintentionally.

ReaLock does not permit removing steering wheel when in locked position.

ReaLock is transferable from one car to another without the least injury to car or lock.

ReaLock is made strictly to gauge and snugly fitted by **Real Lock** experts. This eliminates all rattles or noise due to vibration of car.

ReaLock does not disturb or weaken the steering gear.

ReaLock is case-hardened all over, proof against filing, chipping, sawing or cutting.

ReaLock has a Yale paracentric lock; no master keys, unpickable, no two alike.

ReaLock reduces insurance premiums enough to pay for itself.

ReaLock is conveniently placed under the steering wheel.

ReaLock can be installed in fifteen minutes, using only a breast drill and screwdriver.

Fully approved by the Underwriters' Laboratories.

Write us direct for exclusive territory.

ReaLock Manufacturing Co.

1714 S. Michigan Ave.,

Chicago, Ill.



Don't Freeze or Fry Your Feet!

ICY cold drafts coming through the pedal slots in winter—parching, oven-hot blasts that pour up from the engine in summer—these discomforts are ended by the **DRAFTITE**.

Every Ford car, open or closed, needs one. Besides protecting from heat and cold it shuts out all dust, dirt and smells that come up through the pedal slots.

Easily attached with one transmission cover screw. No connection with floor boards which rest on it.

Made of heavy sheet steel, electrically welded and finished in rust-proof black japan. **Outlasts the car.**

List Price, \$2.50

Ask your jobber
or write us

Manufactured by

PETTITT-BICKFORD CO.
WAYZATA, MINN.



NORMAN

flexible PISTON RING

Flexibility is an all-important feature that a piston ring must have to give highly efficient service. It is an outstanding feature of the NORMAN Ring. The NORMAN exclusive method of graduated peening (deepest opposite the joint) gives full and permanent flexibility. This greater flexibility permits NORMAN Piston Rings to adjust themselves instantly and automatically to the contour of the cylinder wall, insuring a seal against leakage of oil and power.

The NORMAN joint is another worthy feature. Long, heavy fillets create a leak-tight seal and greatly increase the strength at the joint. The ring will open more than $\frac{1}{8}$ " before any leakage can possibly occur. Rounded ends make installation easy without danger of breakage.

NORMAN Rings are extremely accurate in width and of a thickness that conforms perfectly to manufacturers' specifications. It is never necessary to order "shallow rings" for NORMAN Flexible Piston Rings are standard and can be used universally.

These rings are single cast from special grade of refined gray iron, heat treated, oil tempered and pressure peened. Where the finest results are wanted you will find it pays to use NORMAN FLEXIBLE PISTON RINGS.

If your jobber has not stocked these rings yet write to us for a sample ring, literature and complete information.

NORMAN MANUFACTURING CO.

Davenport, Iowa



And Yet It's Not a High Priced Ring

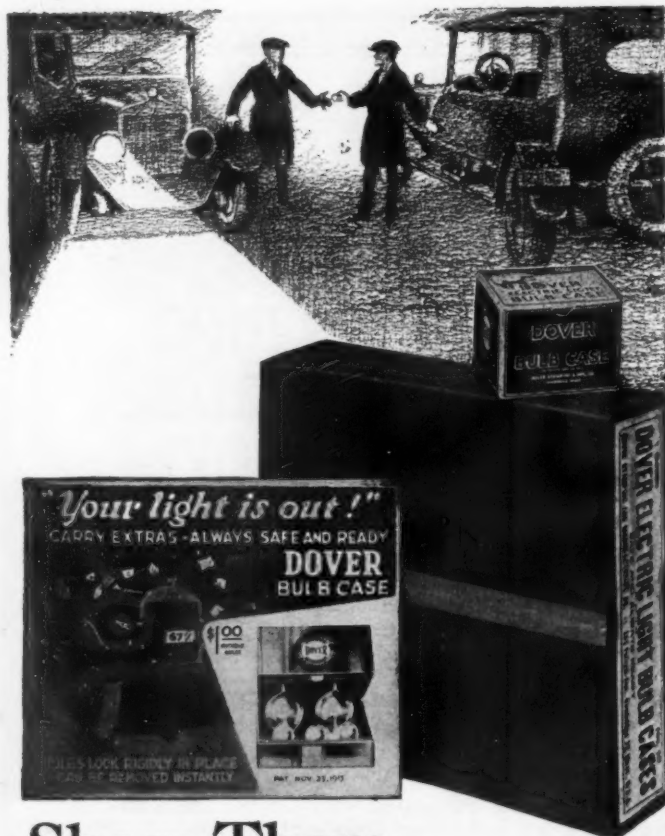
PRICES

2½" up to and
including 4"

60c

Over 4" up to and
including 5"

80c



Show Them Dover Bulb Cases and They'll Buy 'Em

Bulbs can't break in Dover Bulb Cases. The snug little compartments hold the new, fresh bulbs securely, and safely.

When a new lamp is needed to replace the old one—the motorist can bank on finding one safe and sound, whole and ready to work—if he carries his lamps in a Dover Bulb Case.

Dealers and Jobbers: Dover Bulb cases fill a real need—are priced right—and sell fast. Display them and sell them. Make another profit. Write today.

A complete case holding 2 large and 3 small bulbs only \$1.00. (Without bulbs)



DOVER STAMPING & MANUFACTURING CO.
385 Putnam Avenue
CAMBRIDGE 39, MASSACHUSETTS, U. S. A.



Oiling System for Ford Cars and Trucks

Quick turnover of a stock of YALE Oiling Systems is a practically foregone conclusion. Any Ford-owner who knows anything about lubricating his car sees its advantage instantly. The rest is just asking him to buy.

Installed in 20 Minutes

There are only two parts to the YALE Oiling System. They fit into holes already tapped. You have only to remove a few screws and replace them after setting the YALE System in place. Everything is thought of and prepared. And a small installation fee adds to the already large profits.

Success Thoroughly Proved

Several hundred were observed daily in hard service before any were offered for general sale. Nearly sixty thousand are now in use, conserving brake bands, cylinder walls, bearings and tempers. One service man figures a YALE System pays for itself and six dollars over in repairs saved the first year. In addition to mechanical benefits, a YALE does away with cleaning the magneto post, and the shorts that occur through metal "wearings" accumulating there.

Opportunity for Jobbers

A steady advertising campaign is now running, and a crew of capable missionaries are successfully introducing YALE Oilers into new territory. Jobbers who take advantage of this activity will add materially to 1923's profits.

Sales-Help Given

Illustrated circulars, and posters in colors are sent to dealers to help speed the turnover of YALE Oiling Systems. Inquiries are answered with full explanations, and the offer of a proposition that will add a neat sum to any dealer's bank balance. Mail your inquiry this hour.

ROLAND & KOCH

Successors to

THE YALE CORPORATION

411 S. Main St.,

Los Angeles, Cal.

Not by Chance —but by Actual Results

—The Cincinnati Enquirer carries the largest amount of NEW CAR advertising in Cincinnati.

Display figures for the year 1922 show:

ENQUIRER	462,294	2nd paper.....	180,572
3rd paper.....	157,108	4th paper.....	83,720

or in other words The Enquirer against the other three papers combined carried

40,894 more lines.

Cincinnati dealers and distributors select The Enquirer—because it produces results.

When you think of Cincinnati---think first of

THE CINCINNATI ENQUIRER

One of the World's Greatest Newspapers

BOB BEISER—AUTOMOBILE EDITOR

I. A. KLEIN—NEW YORK & CHICAGO REPRESENTATIVES

1923 AUTO SHOW EDITION, FEBRUARY 4TH

To Dealers and Garagemen

Your USED CAR proposition is a big job—a lot of worry—and oftentimes the difference between profit and loss. A short time ago The Cincinnati Enquirer ran a series of Used Car articles that have lived long after their publication. This series "took up" the whole Used Car argument from the dealer's standpoint, the factory and the "shopper." They went over big here in Cincinnati and were reprinted by request.

There is a limited amount left that we would be glad to mail to any dealers that are interested. It is needless to say that they are free. Use the attached coupon.

↓ USE THIS COUPON

The Cincinnati Enquirer,
Automobile Editor,
Cincinnati, Ohio

Kindly send me free reprints and oblige

NAME

ADDRESS

CITY

STATE



The Solder and Flux are applied together

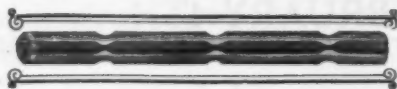
THAT'S why Kester Acid-Core Wire Solder "requires only heat"—The flux is contained in tiny pockets within the hollow wire solder and as the heat is applied these pockets are melted and the proper amount of flux is released on the job.

This feature saves the mechanic hours of valuable time and permits the novice to do soldering successfully.

The wide-awake garage owner supplies his mechanics with Kester Acid-Core Wire Solder and stocks it to sell to his trade. In selling Kester Solder he builds a lasting impression and creates an endless amount of good will.

KESTER

Acid Core WIRE SOLDER



Manufactured by the

CHICAGO SOLDER CO.

Direct Factory Representatives:

Faucette-Huston Co.
Chattanooga, Tenn.

Louis J. Ziesel Co.
216 Market St.
San Francisco, Calif.

**CHICAGO SOLDER
COMPANY**
4203 Wrightwood Ave., Chicago, Ill.

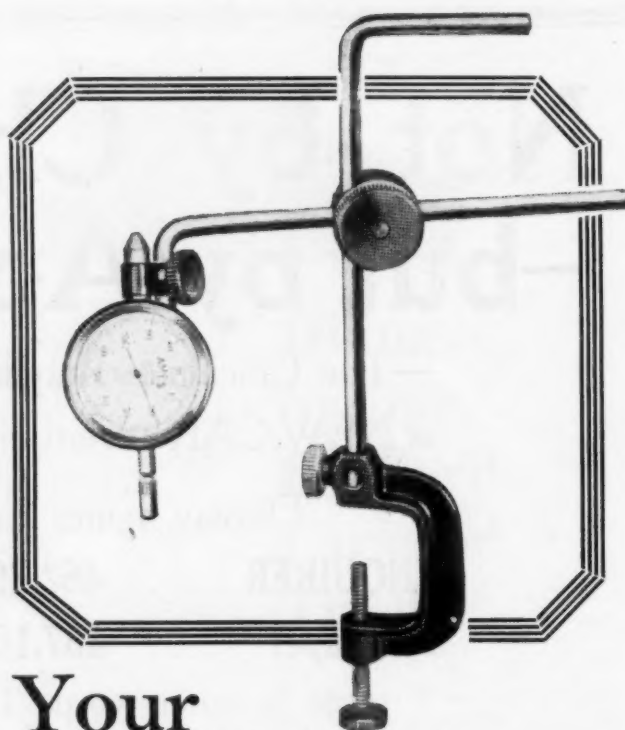
M.A. 1-25-23

Please send me a sample of Kester Acid-Core Solder, no charges, postage prepaid.

Name

Address

Supply House



Your Ames Dial Head Needs This!

Turns your Ames Jr. Cylinder Gauge into a complete testing outfit.

Tests straightness of crankshafts, camshafts, valve-stems, also the lift of valves and cams.

Checks thickness of piston rings, shims, bearing liners; also diameters of pistons, wrist-pins, valve stems, push rods, transmission gears and shafts. Shows if flywheels run true.

Junior Universal Attachment only \$5.00.
Junior Dial Gauge Head only \$10.00. Junior
Cylinder Gauge Mount only \$7.50. Terms cash
or C.O.D. parcel post.

Write for
circular.



BC. AMES CO.
WALTHAM MASS. U.S.A.

Your 1923 Equipment

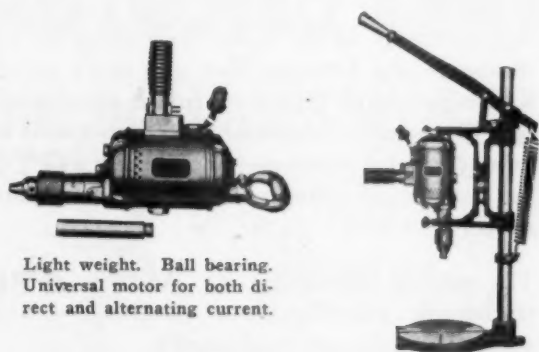
Rapid production and low operating costs are possible only with the most efficient, modern tools.

Make 1923 a profitable year by equipping your shop with



They will pay for themselves in a short time, then yield a clear profit year after year.

½" "CINCINNATI" GARAGE SPECIAL
PORTABLE ELECTRIC DRILL AND
COMBINATION BENCH DRILLING STAND



Light weight. Ball bearing.
Universal motor for both direct and alternating current.

DRILL, \$65 STAND, \$24

f. o. b. Cincinnati

Drills in all sizes—Grinders for every purpose. Write for catalog.

THE CINCINNATI ELECTRICAL TOOL COMPANY

1515 Freeman Ave., Cincinnati, Ohio

NEW YORK, 50 Church St.	PHILADELPHIA, 1220 Real Estate Trust Bldg.	DETROIT, Murphy Bldg.
SAN FRANCISCO, 918 Hearst Bldg.	LOS ANGELES, 510 Equitable Bldg.	



*The
LITTLE WATCHMAN
for Fords*

Ford Owners Have Long Wanted This Triple Protection

Ask any Ford owner:

IF he enjoys removing the seat and poking a measuring stick down into the tank every time he wants to know how much gas he's got—

IF he enjoys getting stuck without gas on a country road, miles from a supply station—

IF he enjoys the thought of having his car stolen whenever he leaves it—

And—

IF he would pay five dollars for a Little Watchman that would put an end to these annoyances and risks—a Little Watchman that anyone can install—a Little Watchman that attaches to the front of the driver's seat, tells at a glance how much gas there is, provides a reserve supply of fuel when the gas runs down, and locks the gas so tight with a patented tumbler lock that no thief can drive the car away!

A good friend, is this Little Watchman. And a sure money maker. Sells because it's WANTED. Requires no service. Good discounts to jobbers and dealers. Write today for full particulars.

Three styles—coupe, touring and sedan.

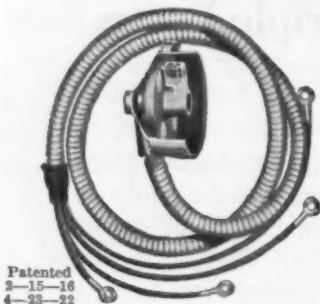
Autoquip Mfg Co. Inc.

Rochester, N. Y.



AN INSTANT START AND PERFECT IG- NITION IN ALL WEATHER

The TURNER 2 in 1 TIMER is a truly "all weather" device. It assures an instant start for your Ford in all weather and the metal conduit prevents shorting from water-soaked wires.



Patented
2-15-16
4-23-22

TURNER 2 in 1 TIMER

Sales on the famous Turner 2 in 1 Timer for Fords have never been so great as at the present time. Time and again our production has been increased (several times doubled) to meet the ever growing demand for this great timer.

Has stood repeated and rigid tests for over five years. Increases power, insures an instant start in all weather, lessens fouling of two front plugs, saves gasoline and stops motor "kicking." Is oil, grease and water proof. Requires no oiling and is easily installed.

Price Complete **\$3.60**

ANNOUNCING TURNER (ALL METAL) VISOR

The newest addition to the famous Turner 2 in 1 Line. The Turner (all metal) Visor and Storm Shield can be installed on any car in 5 minutes and instantly becomes a part of the car. It adds beauty, protects from sun, headlights, and storms. It has features that cannot be found on any other visor. Price..... **\$3.75**

The complete TURNER LINE will be shown at the Chicago Automobile Show, Coliseum.

TURNER MANUFACTURING CO.
KOKOMO, INDIANA, U. S. A.

TURNER



The Best Time to Match a Thread

Imagine telling a car owner that you had to hold his job up until you could get hold of a wrench somewhere!

Yet you might as well tell him that as to say you couldn't match a thread. **It's all the same to him.** The time to match a thread is **WHEN IT'S WANTED.**

And it's easy to do, now. For there isn't a thread in the business that you can't match with a proper **GTD** screw plate assortment. **GTD** has made a specialty of shop needs in taps, dies and reamers—and there's a **GTD** set just exactly suited to the demands of your shop.

The catalog tells about it. And the **GTD** trademark protects your purchase—it's a symbol of supreme tool quality.



Demand **GTD** Twist Drills for your drill press, electric or breast drill. Their ability to stand up under hard use is guaranteed by the **GTD** trademark.



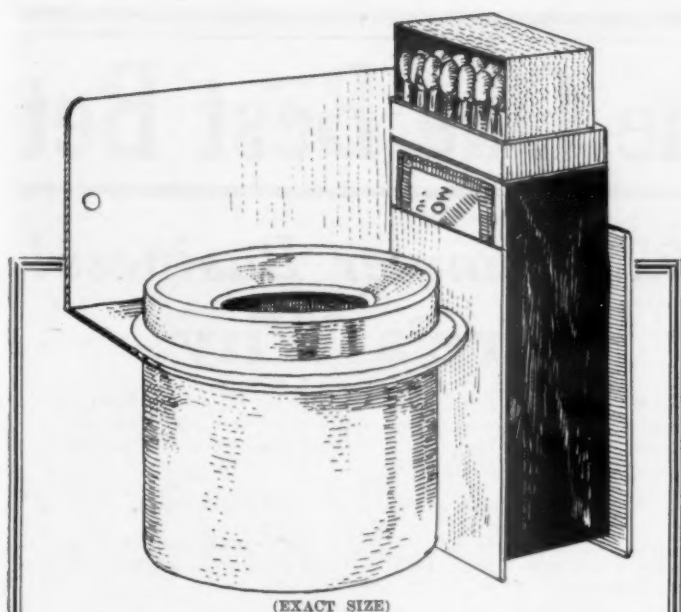
This **GTD** Adjustable Reamer will replace a large number of solid reamers. Has a .042" range of adjustment.



Little Giant A Combination U. S. S. and S. A. E. Standard thread Screw Plate. One of these sets is absolutely necessary in every shop which has a service department.

G T D
GREENFIELD TAP AND DIE
CORPORATION
GREENFIELD, MASS., U.S.A.

"The Well-Equipped Shop Gets the Business"



"Han-D"

AUTO ASH TRAY

BIG DOLLAR'S WORTH



WHICH MAKES IT A
FAST-MOVER!

DRIVERS find it almost indispensable—it's so handy—so tidy.

DEALERS, Garage Men, like 'em for the big profit they make.

Standing on your show case or wall in an attractive 3 color Display Stand, attracts attention—then the sale is made.

Order a trial dozen from your Jobber—but order by name, so as to be sure it's a "Han-D"—nothing as good on the market. Display Stand with each dozen.

You'll order again and again—you'll profit big again and again too.

JOBBERS, write for prices—You too make a profit worth having—Shipments made the day orders are received.

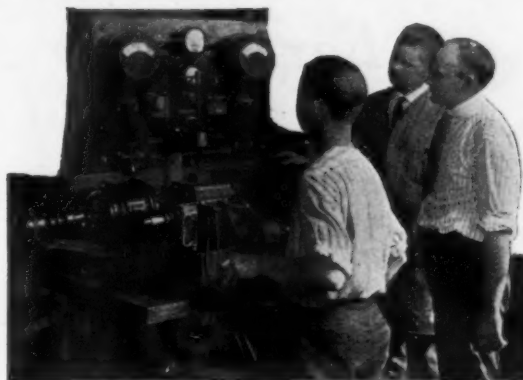
Patented Specialties Co.

314 A Nicollet

Minneapolis, Minn.

MECHANICS

Step Out of the Rut



Specialize in Automotive Electricity

Over 75% of real automobile troubles are electrical, yet how few mechanics there are who can really diagnose and remedy all forms of ignition, starting, lighting and storage battery troubles **QUICKLY** and **ACCURATELY**.

Experts Train You

Our Staff of Specialists will give you the thorough training you need to qualify as an expert at a good salary—or to start your own business.

In Three Months

13 weeks of intensive, practical training is just what you need. Ideal working conditions. Low tuition. Endorsed by authorities. Begin your training the first Monday of next month. Write for big illustrated book of facts. It's **FREE**.

SPECIAL

Personal instruction offered by mail to those who cannot come to Milwaukee now.

ENDORSED

By the Automotive Electrical Association of Wisconsin.

Ask for details—Mail the coupon today.

SCHOOL OF AUTOMOTIVE ELECTRICITY INC.

415 Marshall St. Dept. MA, Milwaukee, Wis.

School of Automotive Electricity, Inc.,
415 Marshall St. Dept. MA., Milwaukee, Wis.

Gentlemen:

I would like to know more about how to become a Certified Automotive Electrician.



Send me **FREE** catalog and details regarding

.....3 months' day course.

.....9 months' evening course.

.....Home Service Training.

Name Age.....

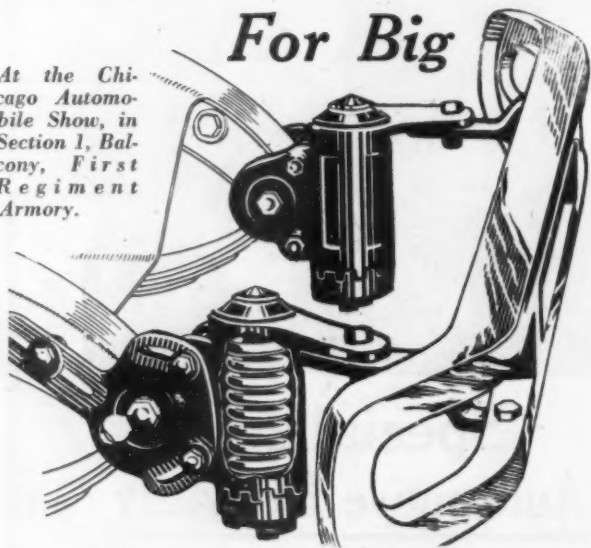
City State.....

Ramsprings—The One Best Bet

For Big

1923 Bumper Business!
Here's Why:

At the Chicago Automobile Show, in Section 1, Balcony, First Regiment Armory.



The RAMSPRING exclusively has "Bumper Shock Absorbers" (patented) back of the bar, that absorb the full force of the impact, from a bump to a terrific crash, high or low—at any angle. (Note particularly quick-installation, universal bracket in above illustration, and exposed view of Coil-Spring.)

Detailed descriptive matter sent upon request.

When you sell the RAMSPRING your profit is not impaired because of price competition resultant from imitation and close resemblance, for the RAMSPRING is exclusive in design and patented in principle.

Its identity and efficiency are never challenged.

The Ramspring has established a new high standard in bumper construction and has sprung into popular favor as a big leader.

Car Distributors, Dealers, Manufacturers and Accessory Jobbers have been quick to take it on, and they are registering large sales.

We are backing the Ramspring with strong Sales Promotion and National Advertising.

Our Sales Franchise is still available for some territories.

Write or wire

THE RAMSPRING BUMPER CO.,

624 W. Adams St., CHICAGO

Rie Nie
Vee
Round

Double Your Fan Belt Sales
In One Half The Time

Rie Nie
Flat
Type

Rie Nie
Trade Mark

If motors could talk, they would praise the matchless resistance of the Rie Nie Fan Belt to their sputtering oil and water—their intense heat. Rie Nie Fan Belts are guaranteed to outlast all other makes. They are built for reliable service and long life. Time has proved them a source of distinct satisfaction to every user—a source of distinct profits to every dealer.

Rie Nie "Vee Round"—the ideal "V" pulley Fan Belt, never slips despite the rate of speed

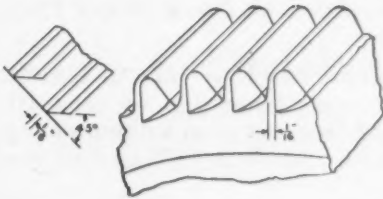
—never breaks—never rots. Rie Nie "Vee Round" or "Flat Type" Fan Belts are built of firm, specially woven fabric and rubber compound—jacketed, and vulcanized into one powerful unit—flexible yet stretchless. Standard sizes—a fit for every car, truck and tractor requiring a fan belt.

Your jobber can supply you, or write direct to us. Our attractive 1923 dealer's proposition will appeal to you.

DURKEE-ATWOOD COMPANY

Minneapolis, Minnesota

Exactly the same!



Notice the peculiar pointing of the gear recommended by the manufacturer of the Bendix Drive, shown at the left. Then compare this pointing with that of the Huetter Gear Band at the right. It's not only *similar* — it's *identical*.



Huetter Fly-Wheel Gear Bands are chamfered to specifications recommended by the manufacturers of the Eclipse Bendix Drive. This chamfer not only retains the maximum strength in the point of the tooth, but assures positive, easy, quiet meshing. Identical pointing is as necessary to correct meshing as identical pitch.

Huetter Gears are machined out of hard, tough steel—the best grade we can get—and are electric welded. That's why "Huetter Gears are better gears."

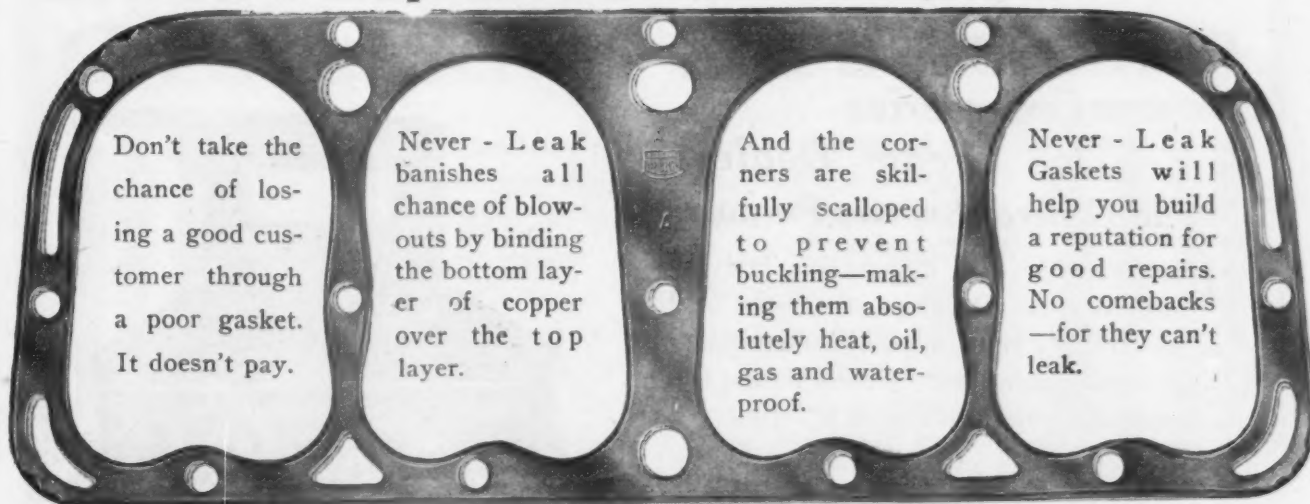
HUETTER MACHINE
& TOOL CO.
560 Kentucky Ave.,
INDIANAPOLIS

Huetter's

Fly-Wheel Gear Bands

New Price List
Published
Send for Yours NOW!

Can't Blow Out—Serve Longer —insure permanent customer satisfaction



Don't take the chance of losing a good customer through a poor gasket. It doesn't pay.

Never - Leak banishes all chance of blow-outs by binding the bottom layer of copper over the top layer.

And the corners are skillfully scalloped to prevent buckling—making them absolutely heat, oil, gas and water-proof.

Never - Leak Gaskets will help you build a reputation for good repairs. No comebacks—for they can't leak.

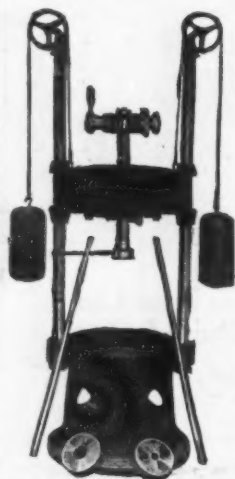
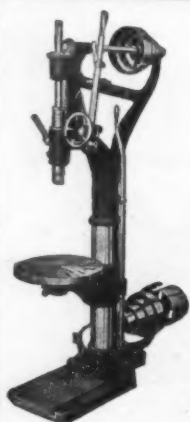
A sample gasket for any car, truck or tractor sent on request, either direct or through your jobber.

Never-Leak gaskets are listed, pictured and priced in our catalog—copy sent on request.

THE FITZGERALD MFG. CO.

TORRINGTON, CONN.

NEVER-LEAK Cylinder Head Gaskets



3 Machines for the GARAGE

An 18 inch Lathe

A 20 inch Drill

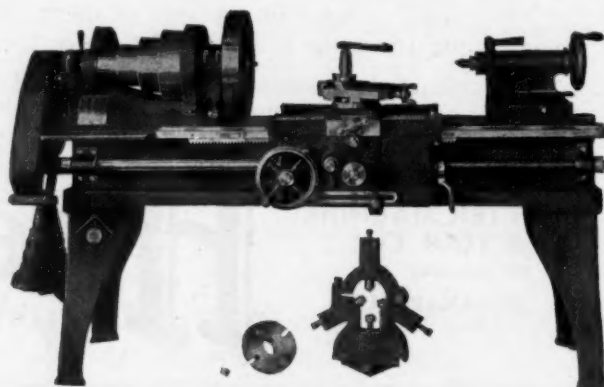
A No. 2 Arbor Press

This 18" Barnes Lathe swings 18" over bed ways; has $1\frac{5}{8}$ " hole in spindle; cuts threads 1 to 56; takes 3" wide belt on cone; large step of cone 10" diameter; has automatic crossfeed; 4 changes of feed in apron without changing gear. Workmanship and material of the best. Made in 6, 8 and 10 foot beds.

The Barnes 20" Drill is too well known to require any comment. The No. 2 Adjustable Arbor Press is a machine for use in the Garage Repair Shop for pressing shafts into and out of pulleys, gears, hubs, etc., and for straightening automobile axles and frames.

**W. F. and John
Barnes Co.**

439 Ruby St.
Rockford, Ill.



Model 300 Steel Open Express Body

*for—Ice Men
Creameries
Ice Cream Dealers
and General Express Purposes*

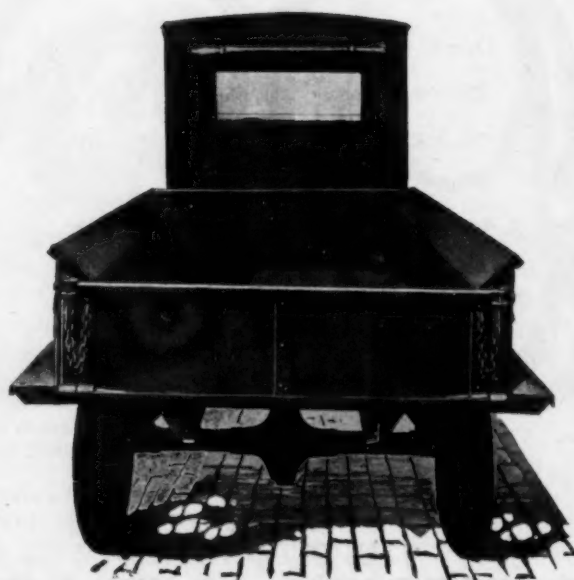
THIS sturdy and dependable body is built of No. 10 gauge steel—the bottom is strongly reinforced by seven heavy angle irons welded transversely across the bottom—it is built to last a life-time.

It is equipped with an all-steel drop end-gate and heavy duty fenders.

There is a Galion Body to meet every requirement—and all makes of trucks.

Write Today for Prices

The Galion Allsteel Body Co.
GALION, OHIO



Dimensions—Width, 45". Length, 96".
Side Panels, 16" & Up. Side Flares, 5".

\$1000.00 A YEAR PROFIT ON ONE JOB A WEEK WITH A

Simplicity

Portable Cylinder Grinder

This is being done by garages equipped with a Simplicity. Don't send your cylinder work away—do it right in your shop and make money and satisfied customers.



Adjustable Boring Head:
The boring head has two cutter blades which permit the use of an outside Micrometer in adjusting to any desired oversize and the finished cut will be equal-

ly as smooth as is possible to make by the use of any boring tool or reamer.

Adjustable Grinding Head:

The grinding head operates on an eccentric and revolving grinding wheel travels in a circular path around the hole; the path of the wheel is controlled by means of a Micrometer screw, which can be readily adjusted to any desired oversize.



The field is unlimited—there are over 10,000,000 cars and trucks all needing periodical regrinding. Your community has its share.

The Simplicity is different from all other grinders on the market. It is the only machine that will both bore and grind and it is the only portable grinder.

Remember car owners are being educated to have their cylinders REGROUND.

WHAT IT DOES

Grinds either open or closed head automobile, truck or tractor motors, ranging in bores from 2 3/4" to 5 1/16" deep. Serves your customers promptly without sending block out. Grinds cylinders exactly to size, insuring an accurate, close fit. Takes the place of equipment costing many times as much. Enables you to retain the profits you have been giving the other fellow.

Satisfies your customers because it REGRINDS.

LOW IN PRICE—GUARANTEED TO PRODUCE WORK. EQUAL IN ACCURACY AND SMOOTHNESS, TO THE ORIGINAL FACTORY JOB, ON A NEW BLOCK.



Furnished complete with motor, boring head, grinding head, grinding wheels, centering device and complete instructions for operating.

SIMPLICITY ENGINE & MFG. CO., 56 Lake Street, Port Washington, Wis.

Less Trouble and Expense Greater Service and Satisfaction

HILAB Leather Fan Belts are so far ahead of substitute belts that you can sell them with less trouble and expense. They will give your customers greater service and satisfaction—and will return you more liberal profits. There is a HILAB Fan Belt for every need—in rolls, groups or racks; flat or "V". Also Cone Clutch Facings, Universal Joint Discs, Radiator Hose, Anti-Squeak Lacing, etc. Ask your jobber for catalog and discounts.

Hide, Leather & Belting Co.

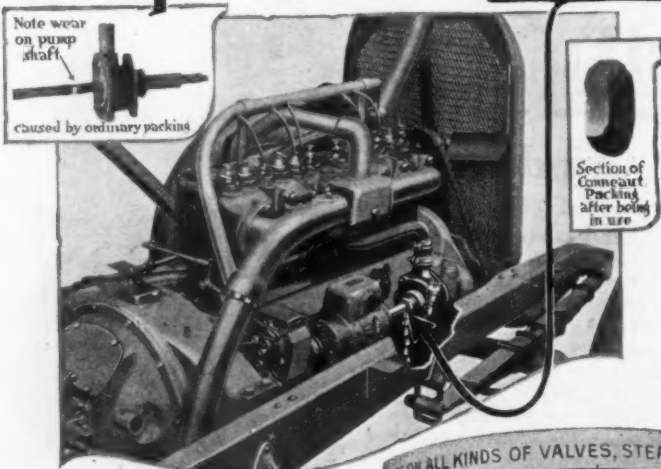
*Pioneer Manufacturers of Leather
Automotive Products—Since 1870.*

Detroit Memphis
Evansville New York

INDIANAPOLIS



Stop That Leak Mr. Garage Man—



"Conneaut" Plastic Metallic Packing is a semi-metal composition, compounded by a special process that produces a non-corrosive, practically frictionless bearing against shafts and is particularly adapted to automobile water pumps.

Put up for your convenience in 1 lb. dirt proof, slipcover cans with full directions for using.



You know the difficulty of packing a troublesome water pump on an automobile. You know the tendency it has to leak all the time—and the more you tighten the packing nut the more the shaft wears.

The customer kicks—and you run the chance of losing his Good Will.

What will stop it?

A metal packing—plastic in form—that you can mold quickly with the fingers to fit a stuffing box of any size—and that will seal pump shafts *tight* even after they have become worn and are difficult to hold with other packing methods.

Once this packing is installed right—and it's easy to do it—you eliminate, once and for all, the leaky water pump—and you know what the customer is going to say to that.

This is exactly what "Conneaut" Plastic Metallic Packing does—and it does it all easily, quickly, and so effectively that years of long service are the result. A smooth, metal bearing—adjustable and practically frictionless.

Service and Garage Managers—"Conneaut" does the trick. Get it from your Jobber today. Try it once and you'll always want it. Don't forget—order today. Your Jobber has it.

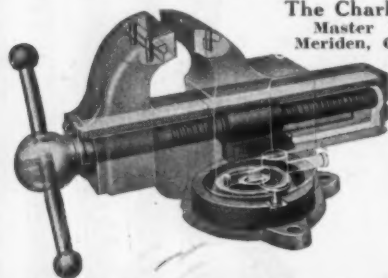
Conneaut Packing Co.
CONNEAUT, OHIO

RENEWABLE Tool Steel Jaws

One of Seven Superior Parker Features

PARKER Vises have removable tool steel jaws that cannot work loose. They are milled to fit and pinned on, not cast or screwed on. Not a face jaw but one that covers the entire top of the vise with steel. When the faces become worn under hard every day use they can be removed easily and replaced by new jaws, thus greatly prolonging the usefulness of the vise.

The Charles Parker Co.
Master Vise Makers
Meriden, Conn., U. S. A.



Send for
Catalog
No. 57-T

**PARKER
VISES**

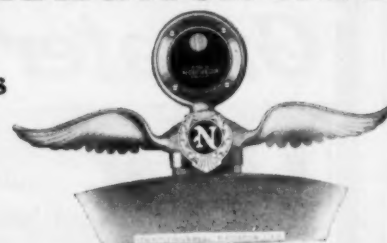
Grip
Like a
Grizzly



DENT UNIVERSAL LOCKING RADIATOR CAPS

Fit 96%
of All Cars

Only Two Sizes
Required

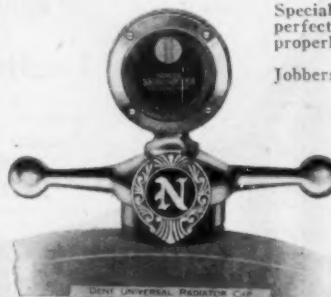


By stocking two sizes you eliminate the necessity of carrying large stocks of thread sizes to take care of your trade. DENT Caps are made in two models as shown—wing and bar. Theft-proof and very ornamental. Tilts back, leaving large opening for filling radiator. Installed by anyone, without special tools. Any initial quickly attached.

Wing Cap for Star Car

Special model which fits the Star car perfectly and allows the hood to open properly.

Jobbers, distributors and dealers wanted.



Write for Literature
and Full Details

**DENT AUTO
EQUIPMENT CO.**

4830-32 Cottage Grove Ave.
Chicago, Ill.



BETTER THAN SHELLAC

Gasko-Cement

always elastic ~ never brittle

The merits of GASKO can be understood and proven best by test—that's all we ask you to do—TRY IT—we know you will want more of it. Send for our 25c trial tube—TODAY—25c in stamps will do—

Ask Your Jobber or Write Us.

GET ACQUAINTED WITH GASKO

VAN SICKLE MFG. CO. LINCOLN, NEB

KING QUALITY
ALL THE NAME IMPLIES

REPLACEMENT PRODUCTS

PISTON PINS
PISTON PIN SET SCREWS
KING BOLTS AND BUSHINGS
TIE ROD BOLTS AND BUSHINGS

For all makes of
Motor Cars and Trucks

AUTOMOTIVE DIVISION ,
KING SEWING MACHINE CO.
Buffalo N. Y.

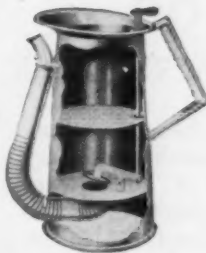


50% More Heat
50% Less Fuel
50% Less Weight

This new Brookins Blow Torch quickly saves its cost in garage work. It burns without pumping, burns steadily when held in any position and delivers a flame so much hotter than ordinary torches that it saves time on every job.

Makes Satisfied Customers

The Brookins Oil Measure saves time, saves oil and makes satisfied customers. The flexible metal nozzle and thumb-control valve fills crank-cases quickly without spilling a drop. Copper-finished. One and two-quart and one-gallon sizes.



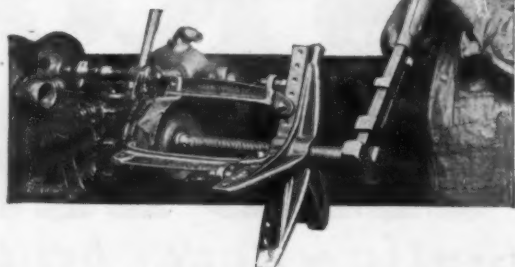
Now also made in one gallon size.

Brookins
PRODUCTS

Order these Brookins Products from your jobber. Or write us for prices and booklet.

THE BROOKINS MFG. CO., 122 BAYARD ST., DAYTON, O.

Nothing Is Tight To This "Crowfoot" Model



Latest design in a family of wheel pullers. A two-arm or three-arm model as you require—a UNIVERSAL Wheel Puller.

Arms drop forged from high carbon steel, screw case hardened with inserted hardened tool-steel point. Guaranteed against defects.

Made in 4 sizes. Other models, too. Equipped with LOCKING Arms.

Our 24-page folder tells all there is to know about pulling tools.

CRANE PULLER CO.
ARLINGTON, MASS.



You can't expect a car to roar with delight when it's hitting on three cylinders. Neither can you expect a spark plug to give even the slightest resemblance of a spark when the insulator has gone bad.

"775" keeps the spark coming all the time. It is scientifically made to resist heat best. That's why it lives longest.

Don't pick out spark plugs at random. The better spark plug makers have learned that "775" insulator means a better plug, without increasing the cost.

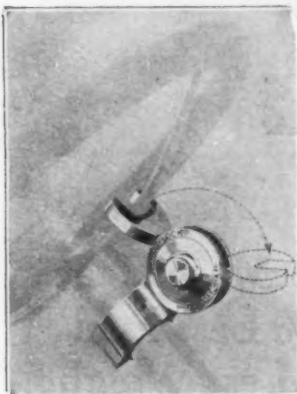
**FRENCHTOWN
PORCELAIN COMPANY**

Trenton, N. J.

"Established 1910
Busy ever since—"



STANDS THE TEST



(Keyless)

**SAFE
-T-
LOCK**

Underwriters' Laboratories
Approved

Price \$10.00

Attached to Steering Post in 5 Minutes

Sell **Safe-T-Lock** and profit. It has everything that appeals to the experienced motorist. Every exposed part is case-hardened 1-32 inch deep. Can't be cut, filed, chipped, or cracked. Conveniently located just under wheel. Can be locked or unlocked in the dark. Combinations simple, unforgettable; can be worked even with heavily gloved hands. Ask your jobber today for liberal discounts, or write us.

Chas. R. Morse Mfg. Co., 24 N. Ada St., Chicago, Ill.

Sales Representatives

Thurston-Palmer Co., 4750 Sheridan Rd., Chicago, Ill.

BOTH Sides Cleaned and Dried With One Sweep Across

The combination cleaning and drying features of Jiffy are making it more and more popular with each succeeding month.

Car owners like it because they are always assured of a clear road view, in all weathers. The mist and fog vanish entirely with one quick sweep across the glass.

Dealers like it because it sells fast. Our attractive display stand insures many quick and profitable sales.

Jiffy is made of aluminum and rubber—with tempered steel spring. No screws or brackets to rattle. Easily installed.

The details will interest you. So will the discounts.

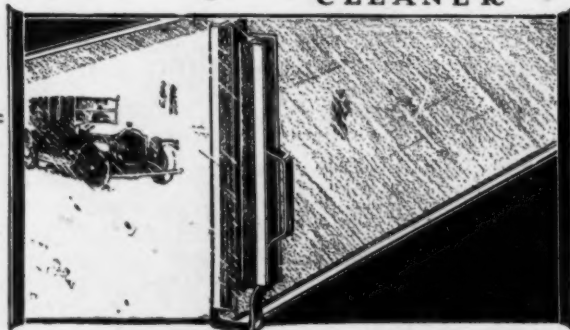
THE LA VIETES MFG. CO.
Station A. New Haven, Conn.

The *Jiffy*

Sells Itself
on Sight

Only
\$1.50

**WINDSHIELD
CLEANER**



JOHNSON GAS APPLIANCES



No. 118

THIS BENCH FURNACE IS A NECESSITY

A modern shop can't do its work properly without some means of developing high temperatures. A shop can't be really profitable unless its equipment is of the highest class, most efficient, most economical.

This furnace is equipped for the modern up-to-date repair shop. It takes only 10x14 inches, but does more work for the space it uses than almost any tool you can name. Burns no more than 40 feet of gas an hour, producing temperatures easily regulated up to 1800 degrees. Tempers tools, heats soldering irons, melts 20 pounds of soft metal, heats rods for bending, welding and forging. Low in price and pays for itself in a short time.

Requires No Forced Air Blast

Send now for the free book that illustrates and describes JOHNSON Gas Appliances. You need it.

C. B. Babcock, 768 Mission St., San Francisco, Calif.
Pacific Coast Representative.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

"If It's Done
With Heat
You Can Do It
BETTER
With Gas."

Features of Construction No. 5

Base Casting Is Strongly Reinforced

CANTON
PORTABLE
CRANE & HOIST

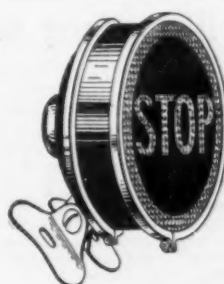


At those points which are subjected to the greatest strain the base casting of the CANTON Portable Crane & Hoist is strongly reinforced. This is in keeping with the scientific design throughout and is one reason why the CANTON Hoist will always lift to its rated capacity with absolute safety to the operator and the work being handled.

Much time and labor will be saved in your shop with this piece of equipment. One man can do work that would otherwise require several men. We have prepared an interesting booklet on the subject of hoists and cranes. Send for a free copy.

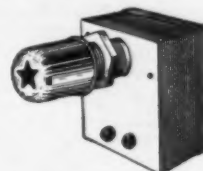
Canton Foundry & Machine Co.
Canton, Ohio

New York Office: 203 E. 15th St.



A Dash Indicator

That Indicates



A NEW PROTEX INVENTION

Two years ago Protex put on the market the first stop signal, a device so perfect that with over 100 imitators it is yet the only one that performs with reliability, endurance and effectiveness.

Protex now announces a dash indicator—again a perfect product—quite different from any such ideas now on the market and one which never fails to show lighted red star on dash if signal performs.

It Sells Separately at \$2.00 List

but is now, at no extra cost, a part of our DeLuxe \$7.50 model which also has steel armored cable, etc.

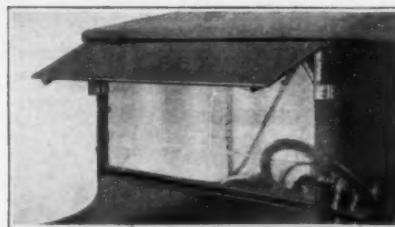
Our "Standard" Model Now Lists at \$5.00

Sold by Jobbers Everywhere

THE PROTEX SIGNAL CO.
Cleveland, Ohio

THE GREEN LINE

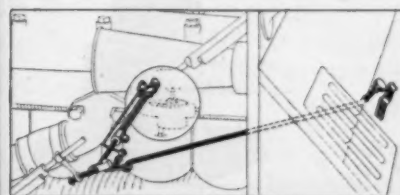
Advise This Visor



Long-grain fabric-leather stretched on wood frame covered with galvanized iron. Stiff, light, soundless, inexpensive, handsome, salable and very profitable. Green, silky, cloth undersurface is easy on eyes. This number of the GREEN LINE has proved itself a repeating moneymaker. Advise every customer to buy one.

The only visor that fits all cars open or closed.
Price \$4.00

GREEN MANUFACTURING CO.
1072 First St., Milwaukee, Wis.

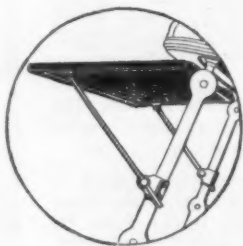


We Put "Sell" in this Accelerator for Fords. We made it so simple and positive that none of the customary objections retard sales. Keeps both hands safely on the wheel. Don't let a Ford-owner leave the shop without knowing all about it.

Price \$1.25

If you're going to sell a visor sell a good one!

A rigid, durable visor that is installed in 10 minutes, easily and quickly adjusted, made for most cars—and is suitable for the finest.



The need of a visor as a part of the car is not disputed any more.

The visor idea is sound. It has been universally accepted. Every car owner is a prospect who needs only to be shown the right visor at the right price to be sold.

The Higgin is the right visor—right in design, right in construction, right in price and right in discounts.

You can sell the Higgin with the assurance that it will stand up and look well and retain its good looks. You can sell it with the assurance that back of it is a company of experience and integrity who know how to treat the dealer fairly, who believe in liberal discounts and who give genuine sales assistance.

The Higgin Manufacturing Co.
Automotive Division Newport, Ky.

Dealers and Jobbers—the Higgin plan insures protected territories, sales getting assistance and worthwhile profits. Write for it.

The HIGGIN VISOR

Eagle Aligning Fixtures Are Business Builders

No garage or repair shop can afford to be without an Eagle fixture. They eliminate any danger of engine overhauling work coming back for adjustments. They make the perfect checking device for satisfactory alignment.

New Sales Plan

It is now possible to buy the Eagle Aligning Device as a special fixture. This gives service stations handling only one or two makes of cars an opportunity to secure this superior fixture at a very reasonable cost. It will pay you to investigate this offer.

Ask your Jobber today or write us for descriptive folder.

Eagle Machine Co.
24 N. Noble St.,
INDIANAPOLIS, IND.



SMITH'S Pre-Heating Torch

Burns kerosene or waste oil drained from crankcase. Takes place of forge, does anything the forge can do and much that the forge cannot. Quicker and much handier for pre-heating than charcoal. Saves 60 per cent of acetylene gas and oxygen in welding. The handiest most profitable tool you can buy. Write for full information.

Address Dept. C

Exclusive
Manufacturers
of

**SMITH'S
INVENTIONS
INCORPORATED**
Minneapolis, Minn.

Welding and
Cutting
Equipment

Valley Buffers Simplify Shop Service



Valley Buffers are equipped with standard Valley Motor parts. They are:

**Rugged
Ball-Bearing
Durable
Simple**

Get one for your shop.

Price \$106.00

2 h. p. 60 Cycle, Two or Three Phase.
Made in sizes from 1-2 h. p. up.

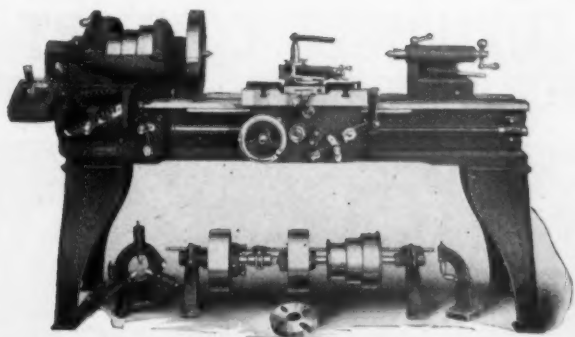
Prices Accordingly.

Also Manufacturers of Flexible Shaft Buffers.

Valley Electric Company,
3155 S. Kingshighway, ST. LOUIS, MO.



Valley Buffers



Watch Your Step— GET A GARAGE LATHE

Don't pick a manufacturing lathe—get a GARAGE Lathe.

C-J specializes in lathes for repair shops. Been building lathes for 20 years.

13, 15 and 16 inch swing, 5 to 12 foot lengths.

Before buying anywhere, send postal for our Bulletins and Special Price Discounts.

Carroll-Jamieson Machine Tool Co.,
Batavia, Ohio



The Ultimate Way WET INTERNAL GRINDING

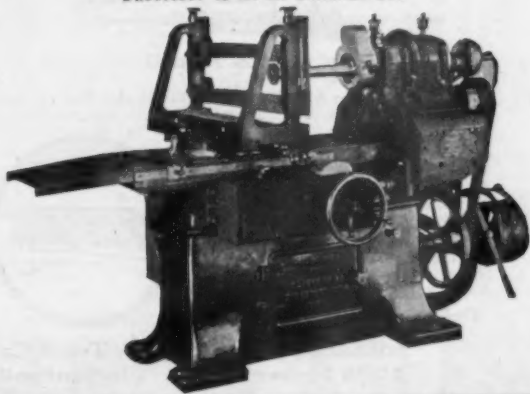
Wet grinding, as made possible by the Micro Internal Grinder, is as far in advance of ordinary dry grinding as the present day automobile is over the old ox team.

Micro

The Micro is a highly developed type of internal grinder adaptable for either wet or dry grinding, at the option of the operator, permitting highest quality of results. Its automatic action, both as to cut, feed and table travel provides the most accurate work humanly possible in exceptionally quick time.

If you're going to get a grinder, get the kind that will pay you bigger returns. Our bulletin gives full information—send for it.

MICRO MACHINE COMPANY, Bettendorf, Iowa
Successor to B. L. Schmidt Co.



Even freezing will not burst it!

The brass honeycomb core of the Atlas Radiator is flexible—it expands as the water freezes which eliminates the danger of bursting.

Furthermore the Atlas is better protected against over-heating in summer.

Its flattened tube construction gives it three times the water capacity of the tubular type and these tubes have four times the cooling surface.

A more efficient Radiator—it is also a stronger one.

In its patented construction a heavy steel bar runs across the rear face and this bar is formed integral with the bracket supports and radiator sides.

Whatever happens the Atlas keeps its true shape.

Made for all Fords and beautifully finished—the Atlas offers a big dealer opportunity. The discounts are right. Write today.



Steidle Mfg. Co.
Cincinnati Ohio

FOR FORDS ATLAS RADIATORS

"The Radiator with a Backbone"



NO more injuries to passengers or car from accidentally opened doors. The American Striker Plate keeps the door closed until you open it—a patented tongue in an ingenious bar does the work—

Don't slam the door—gently close it, and the AMERICAN, with an outside pressure of fifty lbs., holds it safely shut. No rattles, no one can fall out, and no door glass will break. They are in use everywhere—can be put on your car in ten minutes.

DEALERS: This new, fast-selling accessory can be a money maker for you. Made right, priced right. Write today.

Dept. A1

JOHN C. HOOF & CO.

157 W. Illinois St.

CHICAGO, ILL.

American Governor Co., Anderson, Ind., U. S. A.

Ends All Troubles with Ford Timer Wires!



Here's an everlasting short-proof, water-proof, oil-proof, trouble-proof timer wire—for Ford Cars, Trucks or Tractors—the

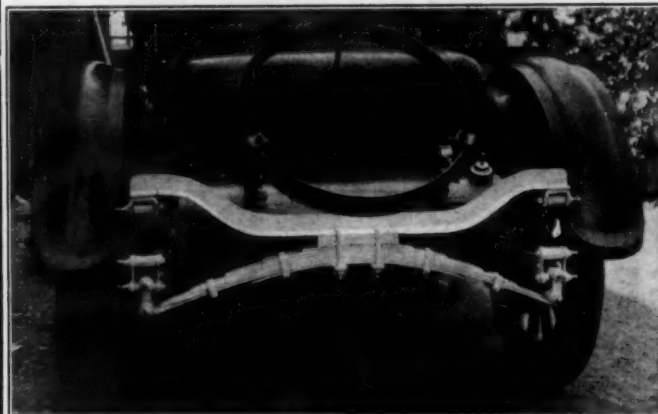
Peterson Short-Proof Timer Wire for Fords

All wires completely covered and protected. Nothing to wear or get out of order. Guaranteed. No need to be constantly buying new timer wires. It saves money and avoids broken arms or starter springs. Not another accessory but a necessity that corrects a source of trouble. Price, only \$2.50.

Jobbers and Dealers! It's selling like wildfire! 3000 sold first 90 days. Large stores are equipping their trucks. Write for our proposition and territory.

P. L. AUTO NECESSITIES CO.
230 Boston Block, Minneapolis, Minn.

LUXURIOUS COMFORT FOR DODGE BROTHERS CARS



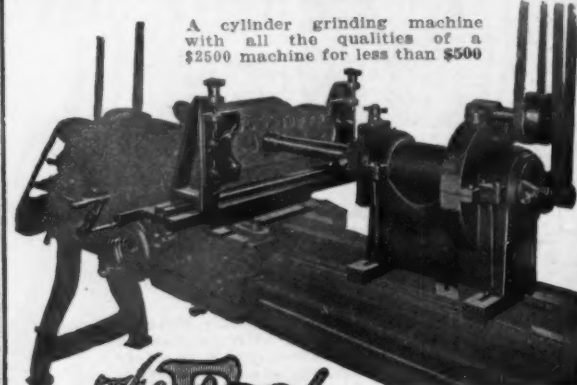
THE A & B PLATFORM SPRING

Eliminates the use of shock absorbers, affords the most luxurious riding comforts, saves tires and spring breakage also provides a full rear bumper protection.

HAS STOOD THE TEST IN THE OIL FIELDS

Thousands Now in Use

A & B SPRING MFG. CO.
Oklahoma City Oklahoma



A cylinder grinding machine with all the qualities of a \$2500 machine for less than \$500

The **FOX**

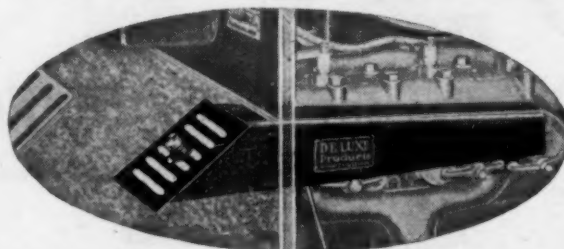
A Money Maker

Make good money in cylinder boring and grinding work. There is a lot of this work to be done and few shops are equipped to take care of it. You can do a big business with a Fox outfit. It costs little and sells on easy terms. Does work equal to highest priced outfits. Can be used on any style cylinder block. Two models; lathe attachment and as separate unit. Write today for illustrated booklet containing complete information. This machine is a money maker.

SUNDERLAND
Machinery and Supply Co.
Machine Shops

Omaha

U. S. A.



You KNOW They Sell

One Dealer in Greenwood, Ind., sold 200 Arvin Heaters DeLuxe—in six weeks. Says he's going to sell 200 more next month, because he knows the REAL selling season is AHEAD!

ARVIN HEATER
DeLuxe

Only \$1.75 Retail

Easily installed in ANY TYPE Ford in 15 minutes. It heats. It sells—and stays sold. Turnovers quick and profits big.

Other DeLuxe Products

Over 5,000,000 Ford owners are live prospects for the DeLuxe Ventilator—for Summer comfort. Sells like hot cakes at only \$1.75. The DeLuxe Tire Pump is DEPENDABLE. Backed by our iron-bound, five-year guarantee. Retail price, only \$3.50.

Order direct, specifying jobber

Indianapolis Pump & Tube Co.
1062 Drovers St. Indianapolis





**STOP
Oil
Pumping**

**STOP
Piston
Slap**

"ASK YOUR JOBBER"

He will tell you Apex Innerings stop oil pumping and piston slap without reboring cylinders. They fit in the ring grooves, utilizing space between piston and ring, insuring perfect centralization of pistons by creating uniform tension at every point of ring circumference, and also enforcing a positive oil and powertight seal.

Retail Price 30c Each

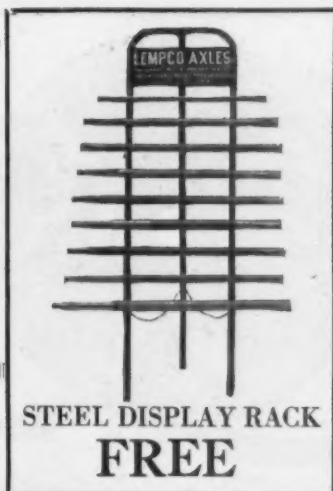
Retail price, 30c ea. up to $\frac{3}{8}$ " wide or 5" dia. (larger sizes 50c). All sizes. Give year, car name, model and if possible size of piston ring. Get free literature.

Jobbers—Dealers—Apex Innerings sell fast—absolutely guaranteed. Write for information and literature.

THOMSON-FRIEDLOB MFG. CO.

Peoria, Dept. C. Illinois
Chicago Branch: 2332 S. Michigan Ave.

GUARANTEED
APEX INNERINGS
(INSIDE PISTON RINGS)



A Big Sales Help

This handsome steel display rack will prove a big booster for your axle business—and will enable you to meet your customers' demands for a high grade product at a low price.

Lemeco distributors carry large and complete stocks, and there is one near you who can supply you immediately with any axle or drive shaft for any make of car. Write today for list of distributors, discounts and price list.

LAKE ERIE METAL PRODUCTS
COMPANY

4001 West 25th St., Cleveland, O.

LEMCO AXLES



The Priming Cup with the "COLD HANDLE"

1. Cannot leak—no lost compression.
2. Actually IMPROVES with use.
3. Positively DUST-PROOF. No dust or grit can get into motor when priming.
4. A COLD HANDLE—no burnt fingers.
5. Solid Brass—cannot rust.
6. Easy to clean—if ever necessary.
7. Tested to 1000 lbs.—and GUARANTEED.
8. Never wears out—good for life.

"LINLEY"

Perfect Priming Cups

DUSTPROOF LEAKPROOF RUSTPROOF

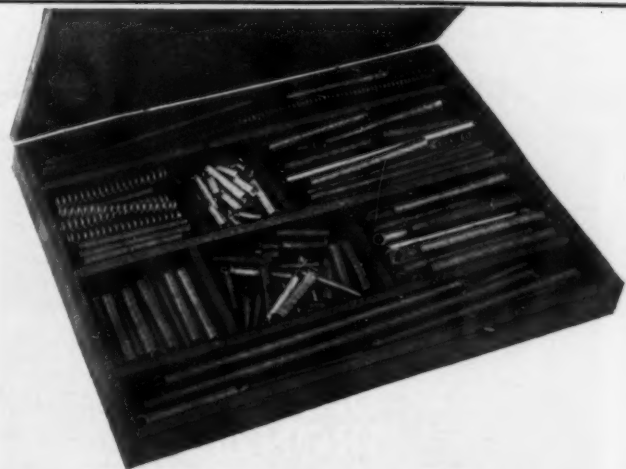
The only absolutely dust-proof and leakproof priming cups on the market. Dust cover, patented feature not found on other priming cups, insures perfectly clean receptacle in which to pour gasoline for priming.

Fibre "Cold Handle" is greatly appreciated in testing hot motors. Passage may be opened without pliers and without burning fingers. Sizes: $\frac{3}{8}$ " standard, $\frac{1}{4}$ " standard, $\frac{1}{4}$ " x $\frac{3}{8}$ " extension (shown in cut).

Price: 40c

DEALERS & JOBBERS: Write for discounts
LINLEY BROS. CO., Stratfield Road,
Bridgeport, Conn.

Springs For All Purposes



Peck's Assortment of coil springs contains about everything needed in the busy Garage, Service Station and Repair Shop in the shape of springs. It is also a ready seller over the Accessory counter. The car owner finds it to be just what he wants and needs. Always ready—no stopping to

make—no waiting—just reach into the box and pick out what you want.

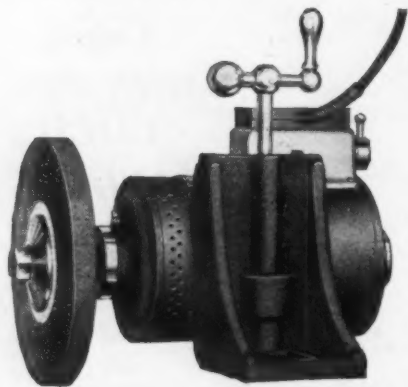
Peck's Assortment of Coil Springs comes to you in a well built wooden box, partitioned off into convenient spaces. Handy, efficient, good. Order your box today. Jobbers—write us for prices and discounts.

THE PECK SPRING CO.

PLAINVILLE,

CONN.

GRINDING



*"first
in the
field"*

The CLARK GRINDER for lathe or tool post is just the tool for the average machine or auto repair shop.

For grinding flat or round surfaces, and finishing semi-finished pistons, it is ready, by throwing the switch, to turn out the work accurately and quickly.

Write for complete catalog of Clark Drills and Grinders with built-in motors.

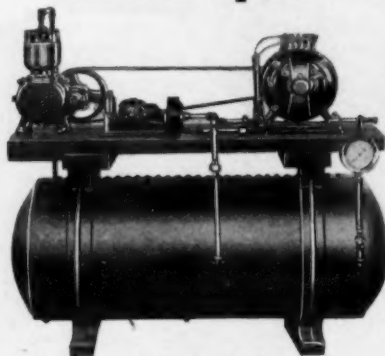
JAS. CLARK, JR. ELECTRIC CO.

INCORPORATED

Factory and Gen'l Offices, Louisville, Ky.



This Garage Unit Insures Uninterrupted Compressor Service



Model 21

A compressor unit that is becoming more and more popular every day—as evidenced by an ever-increasing number of new installations.

How much does it cost you to display a "FREE AIR" sign? Is it a profitable or losing investment?

The answer depends on the ability of your compressor to quickly inflate all kinds of pneumatics at negligible operating cost. If it works with this efficiency, the profits from the extra gasoline, oil and accessories sold will compensate you liberally on your investment.

The Model 21 Garage Unit has no intricate mechanism to get out of order and lasts longer—in good condition. It does its work efficiently, costs little or nothing to maintain, and holds down depreciation costs. It adds appreciably to your net profits.

Ask your jobber about it—or write us.

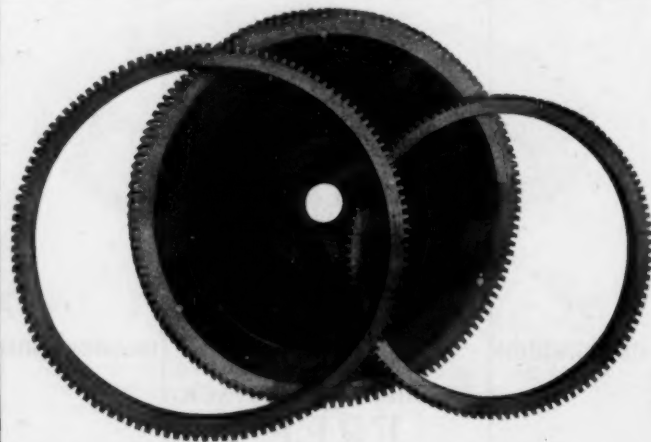
Machine Shop Equipment Co., Grove City, Pa.



**The World's Largest
Ball Plant**

**STEEL
BRASS
BRONZE
MONEL METAL
BELL METAL
ALUMINUM
AND HOLLOW BALLS**

HOOVER STEEL BALL CO.
ANN ARBOR, MICH.



Save Your Fly Wheels

When a tooth breaks in your starter gear why buy a new fly wheel. Simply turn off the gear teeth and fit on a Meachem Steel Ring Gear. It is much cheaper and will outlast the car. Ten thousand in stock.

THE MEACHEM GEAR CORP'N.
Syracuse, N. Y.

ACCURATELY
DALL
MACHINED

**SEMI-STEEL
REPLACEMENT PISTONS**

ACCURATELY
DALL
MACHINED



For replacement work after a rebore or re-grind job insures your customer as good if not a better job than the original assembly.

Dall Pistons are simply GOOD Pistons, made to manufacturer's specifications, sometimes more refined in design and lighter in weight, but always as carefully made and inspected as though they had to pass the most rigid inspection of a Motor Manufacturer.

Dall Pistons are regularly furnished in standard and various oversizes, also semi-finished 1/16 oversize.

Write today for price list and delivery schedule on all items. Distributors at various points will take care of your requirements.

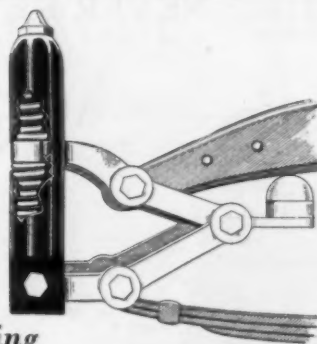
THE DALL MOTOR PARTS COMPANY

Post Office Station D, Cleveland, Ohio

Southwestern Branch

THE CARROLL CO.

2218 S. Harwood St., Dallas, Texas



Announcing

AJAX Shock Absorbers

SOME SHOCK ABSORBERS are constructed to absorb the original shock the car sustains in rough going,—and this is a good method. Others are constructed to check the rebound—and this is a good method. In the AJAX SHOCK ABSORBERS both of these good methods are utilized. Ajax Shock Absorbers are built both to absorb the shock and check the rebound. Note the upper and lower spring device in the illustration.

The year 1923 will see a wide demand for Ajax Absorbers. Not only are they unquestionably the best on the market but, as a new product, they will be vigorously advertised. Interested dealers should write at once.

THE BREWER-TITCHENER CORP'N.
CORTLAND, N. Y.

*At the Chicago Automobile Show
Space 1—Coliseum Gallery*

Come and See Us When in Kansas City



At the Junction
9th and Main Streets

Located in the heart of
the business and shopping
districts. Convenient to
everything.

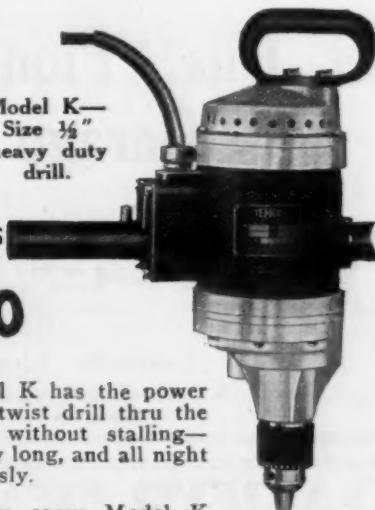
Absolutely Fireproof.
Private Bath in Every
Room
Circulating Ice Water
Free Morning Newspa-
pers
Rooms with Bath \$1.50
and up.

Sam Josephson,
Manager.

A Real Home
**WESTGATE
HOTEL**
Kansas City, Mo.



Model K—
Size 1/2"
heavy duty
drill.



TEMCO
Trade Mark

TEMCO Model K has the power to push a 1/2" twist drill thru the toughest steel without stalling—can do it all day long, and all night long, continuously.

You can easily carry Model K direct to any job and use it in any position. Or it can be quickly mounted in the Temco Drilling Stand, where it will do the work of a stationary drill-press.

Motor operates on both AC and DC. Highest grade ball bearing. Heat-treated gears. Jacobs Geared Chuck.

Many other TEMCO types of Drills and Grinders.

Sold by leading jobbers. See Catalog 18.

The Temco Electric Motor Co.
219 Sugar Street, Leipsic, Ohio

*"Built
to
Last"*

LOST TIME NEVER RETURNS

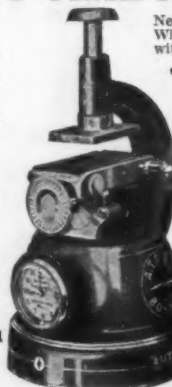
Eight
Combinations
of names
and numbers

Tamper-proof
lock base

Automatic
Change from
A. M. and
P. M.

Shock-proof
action

Dustproof and
Guaranteed
Accurate



Neither does the good money you pay for it. Why not stop all time leaks in your garage, with

THE AUTOMATIC TIME STAMP

Received
Answered
Approved
Paid
Started
Finished
Shipped

Forty years' success in giving business men dependable time records on jobs of all kinds. You are bound to pay for wasted time until you know when, where, and how the waste occurs. Write us today for details and list of users.

Automatic Time Stamp Co.
163 Congress St., Boston, Mass.



E. Z. 2 Sell—2!

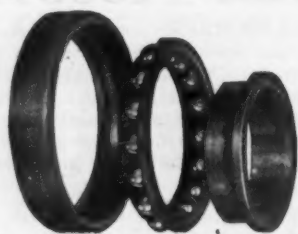
An improved Magneto Plug for the Ford. Makes cleaning easier and quicker. The flange screws permanently on to transmission, using old screw holes. The Plug screws into flange like a spark plug. No oil leaks. Guaranteed. A great dealer proposition. Sells fast and the discounts are big. Get busy. Distributors and Dealers, write for details.

List Price, \$1.00.

The Hazle Specialty Co.,
Hazleton, Penna.

E-Z-2-KLEEN

FORD MAGNETO PLUG



Manufacturers of Thrust Ball Bearings of all types, also Angular Contact Thrust Bearings, Angular Contact Radial Bearings. Let our Engineers help to solve your Bearing problems.

The Bearings Company of America,
Lancaster, Penna.

Detroit, Mich. Office,
1012 Ford Bldg.

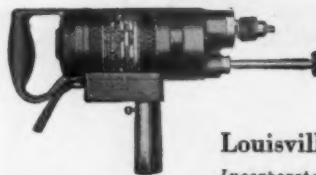
MR. RADIATOR REPAIRMAN



Make your own radiator cores and save 20% to 50% of their cost, give your customers quick service and a better core for less money. No need to carry large stocks of cores, and no damage in shipping. Increase your volume of business. Send for illustrated booklet describing our radiator core equipment. We supply small shops with formed core stock and the small fixtures to build cores complete. Write for information to

Radiator Engineering Co.
626 Nesselwood Ave. Toledo, Ohio

Get This "Pioneer" Garage Special



Electric Drill
and Valve Grinder

Greatest time and money saver, as well as money maker, for your shop—

"It Will Do The Work"

Louisville Electric Mfg. Co.

Incorporated Louisville, Ky., U. S. A.
C. E. Willey, Pres. J. B. McFerran, Secy.-Treas.

COMPLETE INFORMATION

On Automotive Cables, Description—Sizes—Diameters, Classified as to Service—Fully Illustrated Will Be Found in the Current Issue of

Automotive Equipment Association Catalogue.
The Automobile Trade Directory.
Chilton Automobile Directory.

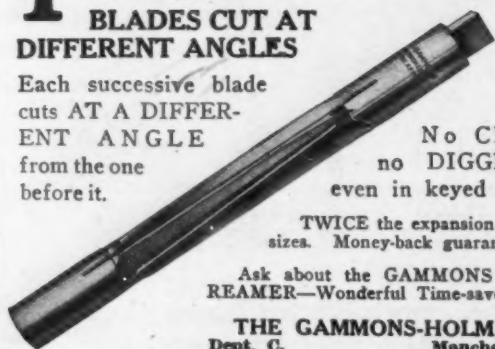
The Packard
Electric Company

WARREN,
OHIO

PAROB EXPANSION HAND REAMER

BLADES CUT AT DIFFERENT ANGLES

Each successive blade cuts AT A DIFFERENT ANGLE from the one before it.



No CHATTER, no DIGGING IN—even in keyed holes.

TWICE the expansion of others. All sizes. Money-back guarantee.

Ask about the GAMMONS TAPER PIN REAMER—Wonderful Time-saver.

THE GAMMONS-HOLMAN CO.
Dept. C. Manchester, Conn.

EVERYDAY—the Only Ring That Is Absolutely Locked

The EVERYDAY Master Lock locks the piston ring Edgewise—Widthwise—Lengthwise, just like a solid ring. You can't force gas—oil—power past the joint.

Write now for the Xtra Profit Plan on EVERYDAY Piston Rings.

EVERYDAY PISTON RING CO., Inc.
East Rochester, N. Y.



Quicker—Safer—More Profitable
THE BURNLEY BATTERY & MANUFACTURING CO.
Northeast, Pa.

THE MCGILL GUARD

Guard your shop from fire, your workmen from burns, your pocketbook from loss, and your customers from neglect. The switch is right under the thumb where it can't be "forgotten." Steel wire guard, steel reflector, both heavily tinned. Capacious hook, big handle. Compact because takes mill-type lamps. Ask your jobber.

McGILL MFG. CO.
Valparaiso, Ind.

Better Light
for Less
Money.

Thumb Switch
Saves Current



The Melville Foot Rest

Installed on
Any Car in a
Few Minutes
\$3.75

Insures Driving Comfort

Marketed
through
Jobbers
and
Dealers
Write for
Discounts



A foe to fatigue.
The weight of the foot
drives the car.
No muscular or nervous
tension.
Eliminates accidental ac-
celeration.
Bumps and boulevards
are all alike with this
foot rest.

The even flow of gas makes
for driving economy.

Depressed to any running
speed, the friction is great enough to
steady and rest the relaxed foot,
allowing the weight of the foot to
drive the car.

Made of polished aluminum.

The Melville Machine Co.

500 Bellevue Ave.,

Detroit, Mich



Pacific Reground Bearings
FOR QUALITY and SERVICE

Large stock Pacific Reground Bear-
ings on hand for immediate ex-
change.

Special Bearings Made to Order

NEW BALL BEARINGS FOR ALL PURPOSES
Western Distributors Bower Roller Bearings

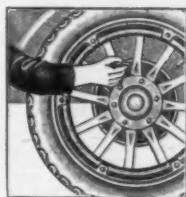
Pacific Ball Bearing Co.

415 WEST PICO STREET

Los Angeles

California

BRAKES WILL SLIP! "JIFFY" Stops the Slips!



The Public is demanding a brake com-
pound which can be easily applied
where it will do the work. We guar-
antee JIFFY BRAKE GRIPPER to
perform this function. Put up in ob-
long, wafer form. Proved in tests
and in service. Thousands of motor-
ists now using "JIFFY" with perfect
satisfaction. Big profit earner for
dealers and jobbers.

Jobbers and manufacturers' representatives
write for our interesting proposition.

Olsen-Möller Manufacturing Co.

606 S. TRIPP AVE.

CHICAGO, ILL.

FOLLETT'S NEW MODEL TIME STAMP

—accounts for every labor minute

Prints the year, month, day, hour, minute,
A. M. or P. M. at the exact moment the
plunger is pressed—like this, for example:

NOV 19 1920 4 31 PM

Tells when a job is started—and when it is
finished. There can be no dispute over the
time charge.

Absolutely automatic—except for winding.
Special machines, with as many as six dif-
ferent words, can be made. Every machine
guaranteed.



Learn the in-
teresting details
from our de-
scriptive data.

Follett Time Recording Co., 7 West Broadway, New York City

TURNER QUALITY GUARANTEED

Axle Shafts
Propeller Shafts
Pinion Shafts
Pump Shafts

Spring Shackle Bolts
Piston Pins
Fan Bolts
Spindle Bolts

Buick Valve Lift Assembly with Guide
for Passenger Cars and Trucks Sold Thru The Jobbers

The Turner Machine & Mfg. Co., Kansas City, Mo.

1200 Models in Stock
AMERICAN Springs
will satisfy your
customers
Every Spring Thoroughly Tested
AMERICAN AUTOPARTS COMPANY
5775 French Road
Detroit, Mich.

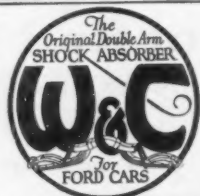


ANY CAR ANY MODEL ANY YEAR
DISTRIBUTORS EVERYWHERE—WRITE FOR CATALOG

Air-Tight Steel Tank Co.
PITTSBURGH, PA.

TANKS

Tanks—High Pressure and Storage—Regular and Spe-
cial to Order—Brazed or Welded—Gasoline Storage
Tanks and Pumps—Structural and Machine Work.
Send us your inquiries or specifications.



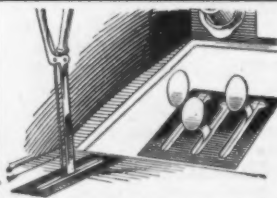
SAY "W. & C."
and Your Jobber Will Give You the
Most Successful
Time-Tried Shock Absorber for Fords
W. & C. Shock Absorbers Sell
P. H. WEBBER COMPANY
Hoopeston Illinois

ENGLERT CORDS
A GOOD dealer will handle nothing but GOOD tires.
Write for our 1923 dealer proposition.
Englert Tire & Rubber Co.
Pittsburgh, U.S.A.



**EKERN'S PORTABLE
GARAGE GREASE GUN**

Stops spilling, and slippery floors. Saves upholstery.
Economizes in grease. Wheels to the job, and sets
solid while working. Send for price and details.
EKERN-TURK MFG. CO. Pipestone, Minnesota



**D-G DRAFT & DUST
PROTECTORS FOR FORDS**
Prevents cold drafts from rushing in
through openings around foot levers and
emergency brake. Does not interfere with
quick removal of floor boards. **\$1.50**
List price.
Authorized jobbers and dealers—Write
for your special discount.
The Dickey-Grabler Works,
Cleveland, Ohio



Pat'd 7-22-'22

WHY PULL THE MOTOR?

The C. A. ADJUSTABLE CENTER BEARING CAP
Corrects end-play in FORD crankshaft and sets
magneto to give full efficiency, without removing
the motor from the car. Installed in a few min-
utes and **GUARANTEED TO WEAR FOR ONE**
YEAR. Retail price, \$3.75. If your jobber or
dealer cannot supply you, write us. Address
Dept. M.

ADJUSTABLE BEARING COMPANY
BRAZIL, IND.



AIRCO IGNITION GAUGE

The Original Ignition Gauge Utilizing Neon
Instantly locates spark plug and other ignition troubles.
Place it alongside the oil can for convenience. Test the
spark plugs every time you oil the car. The motor will
purrr its appreciation.

\$1.00 with Clip and Screws
AIR REDUCTION SALES COMPANY
342 Madison Ave., New York, N. Y.
Pioneer in commercializing the elements of the air.



"FORD FAITHFUL" OILING SYSTEMS

Fully patented—selling fast!

Increases motor efficiency 50 per cent. If your jobber cannot supply you,
write us direct.

W. O. THOMPSON MANUFACTURING CO.
330 Mountain View Street, Pasadena, Calif.

**a profit
earner
for YOU**

**Beacon Visible
Gasoline System**

Double check. Pay only for the gas
you get. Makes satisfied customers.
Write for catalogue.

BEACON VISIBLE PUMP CO.
Incorporated
Louisville, Kentucky

U. S. ASBESTOS
Also Durabestos & Motobestos
BRAKE LINING

Unequalled in its Performance

Write us

United States Asbestos Co.

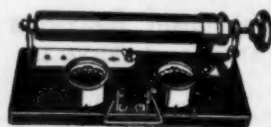
Manheim, Pa.



Garage Tools
Ask your Jobber.

Albertson & Co., Manufacturers, Sioux City, Iowa

Standard tools for fast, ac-
curate work in refacing,
reseating and grinding
any and all size valves,
also Flexible Shaft At-
tachment.



TEST YOUR BATTERIES

by the Chart Method. Something
New. Send for free booklet, today.

Allen-Bradley Co.

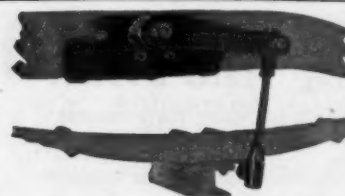
Electric Controlling Apparatus

281 Greenfield Ave., Milwaukee, Wis.

WARNER GEAR COMPANY
MUNCIE, INDIANA



CLUTCHES, TRANSMISSIONS, CONTROLS, DIFFERENTIALS



THE HYDRAULIC CONTROL

More than a Shock Absorber
because it fluid-cushions all move-
ments between the body and the
chassis—gives a new experience in
riding comfort.

Good distribution territory is still to
be allotted. For information write to

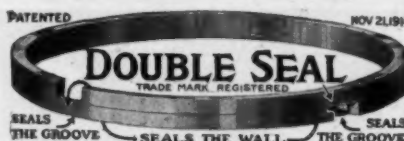
AUTO SPRING CONTROL CO.
Jamestown, N. Y.

The Borg & Beck Clutch

Over 1,500,000 in Use

Write for instructions for adjusting Borg & Beck Clutches.
The Borg & Beck Co., 920 S. Michigan Ave., Chicago

PATENTED



NOV 21 1918 Seals both the cylinder
wall and the piston groove
—the double sealing fea-
ture that has made this
ring famous. Write for
our dealer proposition—
it's a mighty good one.

DOUBLE SEAL RING COMPANY
General Sales Office: 2335 S. Michigan Avenue, CHICAGO

SEE PAGE 5

51-6/10 MILES ON A GALLON OF GAS

It is the official world's record-breaking test with Ford Touring car. The new 1922 Stromberg Carburetor and Hot Spot did it—made this marvelous mileage possible. Tens of thousands of Ford owners are now obtaining more miles on a gallon—quicker getaway—easier starting—increased power and speed—all because of having their cars so equipped. Live dealers are requested to write for facts pertaining to territory.

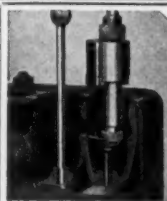
Stromberg Motor Devices Co.

64 E. Twenty-Fifth St. Dept. 27 Chicago, Ill.

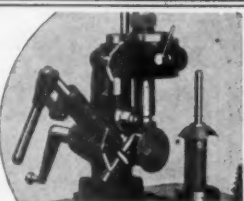
GENERAL ASBESTOS & RUBBER COMPANY

GARCO
ASBESTOS PRODUCTS

Branches
New York Chicago Pittsburgh
Main Office and Factories: Charleston, S. C.



The SPRITE
Doubles Your Profits
Grinds All Valves and Valve Seats with an Emery-Wheel; Reaming Unnecessary; Cuts the Time in Half. Motor runs 15,000 r.p.m. Write for Free plan for making more money on valve work. Circular.
The Throm & Davis Co.
Toledo, Ohio



DEFINITE: Front and Rear:
A complete signal that meets the requirements of all state laws. Looks good on any car—open or closed. Stylish, Durable, Effective. Dealers—Jobbers: Territory being allotted. Details on request.

The
Motor Products Co.
Norwalk, Ohio

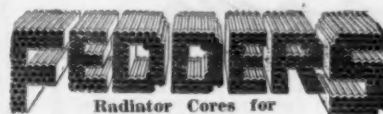
**POMEROY GASAFIERS AT COST**

in unoccupied territory
MR. DEALER: We want YOU to profit the same as 1000 other dealers have in selling the

POMEROY PATENTED GASAFIER

SUMMER VALUE ALSO.—Just ask on your letterhead for our "Get Acquainted" offer—ONE UNIT AT COST FOR YOUR PERSONAL USE. References: Any Rochester, N. Y., Jobber. Cars in your territory will appreciate the service value of PRIME WITH HEAT.

POMEROY ELECTRIC CO., Inc., Mrs., 44 E. Main Street, Rochester, New York



Radiator Cores for Replacement
Can now be had

FEDDERS MANUFACTURING CO.,

Of the Same
Genuine Fedders
Quality

which has made Fedders Radiators standard equipment on America's finest cars.

BUFFALO, N. Y.

COLEMAN
Quick-Fill Tire Pump

"More Air with less Strokes"

Write for Prices

The Coleman Lamp Co., Wichita, Kans.

UNIVERSAL BATTERIES
with the hard,
long life, plates

Write for proposition. Your territory may be open.

Universal Battery Co., 3422 So. LaSalle St.
CHICAGO



(143)

The
NATIONAL COLLAPSIBLE RIM

"On and Off in 30 Seconds"

NATIONAL COLLAPSIBLE RIM CORP.

Knickerbocker Bldg., 42nd St. and Broadway, New York City

WICACO Twin Cut Piston Ring—

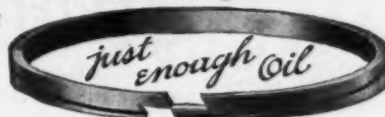
With the Wandering

Oil Groove

[pronounced
WICK-A-CO]

WICACO

SCREW & MACHINE WORKS, INC., 4801 Stenton Ave., Phila., Pa.

**JARVIS WATER INDICATOR**

Prevents trouble due to lack of water. Warns of other danger before it grows serious. When the water gets low so does the red spot. When the water boils, the red spot jumps. Only one moving part. Moderate price, large profit, easily sold. See the Jarvis Water Indicator on the new Maxwell Sport Model. WRITE FOR PROPOSITION.

W. B. JARVIS CO. Grand Rapids, Mich.

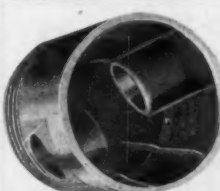
**Connecting Rods Rebabbitted**

and rebuilt with new bolts and nuts, laminated shims, new pin bushings.

Information and prices on request.

WATKINS MFG. COMPANY
260 North Waco Street, Wichita, Kansas
INDIANA WATKINS MFG. CO.
21 West South Street, Indianapolis, Indiana

ALL STATES REBABBITTING SERVICE
1 East 4th Street, Waterloo, Iowa
WATKINS MFG. COMPANY
200 Wyoming Street, Syracuse, New York

**YOUR TRADE WILL APPRECIATE**

FOSTER

Sensible lightweight gray iron pistons.

Our catalog tells why

FOSTER-JOHNSON REAMER CO.
1048 Beardsley Ave. Elkhart, Ind.

Empire
Tires and Tubes
"Wear Longest"

THE NEW EMPIRE
DISTRIBUTION PLAN
enables dealers to make extra profits on these well known super-standard casings and tubes.

Empire Tire & Rubber Corp
TRENTON NEW JERSEY

**BOSCH**

American Bosch Magneto Corp.


Main Office and Works: Springfield, Mass.

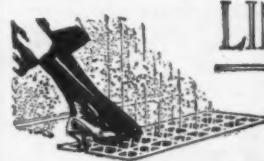
Branches:

New York, Chicago, Detroit, San Francisco

Over 500 Service Stations in 500 Centers

Trade Mark Reg.
U. S. Pat. Off.


 **Specify "R. S. P. VALVES"**
Special Alloy or Chrome Nickel
Standard and Oversize—Forged in one piece
RICH STEEL PRODUCTS CO.
Los Angeles Cal. Battle Creek, Mich.

 **LINENDOLL EXHAUST HEATER**
Warms any car, open or closed.
No odor, smoke, dust or noise.
Easily installed, operated and cleaned.
Sells quickly. Write for our attractive trade proposition.
THE NORWALK AUTO PARTS COMPANY
Norwalk, Ohio


 **Bosch**
Millions of Motorists rely implicitly on the original, genuine **BOSCH MAGNETOS AND SPARK PLUGS**. Send for new edition "Bosch Facts" and "Bosch Victorias."
Robert Bosch Magneto Co., Inc.
Otto Heins, President, 123 West 64th Street, New York

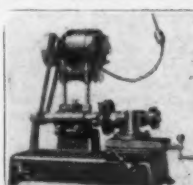
Send for Catalog
TESTING EQUIPMENT FOR ELECTRICAL SERVICE STATIONS
P. J. DURHAM CO.
244 W. 49th St. New York City


Lifts 8 to 12 valve springs in thirty seconds, eliminates the necessity of removing valve springs.
SPEED-O
MULTIPLE VALVE SPRING LIFTER
Write for descriptive data — and details of our special trade offer.
Speed-O Multiple Valve Lifter Corp.
611 Amsterdam Avenue, New York City

 **DAYTON AIR COMPRESSORS**
Automatic Control. Automatic Release.
Start against no load.
Style E-2: 2 3/4 cu. ft. per minute.
140 lb. pressure. Tank 16x36, 32 gallon.
25 ft. hose with air chuck. 1/4 H. P. Motor.
The Lucas Pump & Tool Co.
430 Valley St. Dayton, O.

BURD Piston Rings
EXCEL IN SERVICE AND EFFICIENCY
Sold by All Jobbers
BURD HIGH COMPRESSION RING CO., ROCKFORD, ILL.

 **RELIO The Van Norman VALVO**
Relio, an electric-drive wet grinder for pistons, pins, valves, bushings \$575.
Valvo, an electric-drive bench grinder for valves, valve-seat reamers \$175. See page ads this paper.
Van Norman Machine Tool Co.
Springfield, Mass.

 **THE VALVE GRINDER EVERY SHOP NEEDS**
SAPIHL
General Tool & Equipment Co. Distributors
70 W. Monroe St. Chicago, Ill. **Ten Days' Free Trial**

 **WRITE FOR OUR BOOKLET**
"The Testing and Repairing of Automobile Electrical Equipment as a Profitable Business," which explains the complete Elmco line and how to start and continue the ever increasing business of giving up-to-the-minute electrical service. The profit-making possibilities of this business are also gone into at length.
The Electric Machine Company
337 W. Ohio St., Indianapolis, Ind.
N. F. Andrus, 404 Goldengate Ave., San Francisco

WEL-EVER OIL CONTROL PISTON RINGS
Less Oil and Gas—from WEL-EVER equipped units. Its oil control feature is guaranteed to stop oil pumping, prevent spark plug fouling and reduce carbon formation.
Write for interesting circular on oil pumping and details about this fast selling piston ring.
THE WELEVER PISTON RING CO.
1713-15 Canton St. Toledo, Ohio

 There is a Harvey Steel Disc Wheel in the various styles which we make for each size of car at interesting prices.
HARVEY
Rim & Wheel Co., Inc.
25 E. Jewett Ave., Buffalo, N. Y.

Cut-Outs Match-Ash Holders Accelerators
RUBY
Excel in merit. You profit by knowing them. Ask us!!!
THE RUBY MFG. CO.
SPRINGFIELD, OHIO

ALVORD QUALITY TOOLS

Taps, Dies, Cutters, Drills, Reamers
Send for Catalog
ALVORD REAMER & TOOL COMPANY
Millersburg, Pa.

SHAFER Self-Aligning ROLLER BEARING
offers a complete line of roller bearing replacements for cup and cone ball bearings. Details of sizes upon request.
THE SHAFER BEARING CORPORATION
6501 W. Grand Avenue, Chicago

 **HANDI-PAN**
Like a Pocket in a Shirt
Has many uses. Drain crankcases, test tubes, scrub parts, carry tools, keep parts, throw scrap in it. One piece of heavy gauge galvanized steel. Won't tip over. List price \$2.50. West of Rockies \$3.00.
Mfg. by **Robertson Bros. Mfg. Co.**
5401 S. Western Ave., Chicago, Ill.
Sales Dept. **Standard Motor Parts Co.**
1429 S. Michigan Ave., Chicago, Illinois



The old original, non-drying, non-freezing, ready

**Water-Mixed
Valve Grinding Compound**
Does a better job in half the time.

PEP MFG. CO., INC.
33 West 42nd Street, New York, N. Y.



DOUBLE YOUR OIL SALES

Install one or more units of the Correct Measure Motor Oil Display Pump on your curb. "Make him think of oil." This pump is handsome in design, sturdy, holds 12 gallons. Empty weight 65 lbs. Low center of gravity. Can be rolled to curb in morning and back indoors at night. Delivers $\frac{1}{2}$ gal. in 12 seconds. Price \$45 per unit. Write for details.

CORRECT MEASURE
MOTOR OIL DISPLAY PUMP

Correct Measure Co., Inc.

Rochester, Pa.

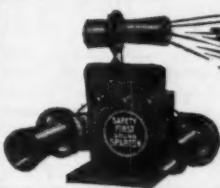


NO-LEAK-O PISTON RINGS

Won't Leak Because They're Sealed With Oil

No-Leak-O Piston Rings are making money for dealers everywhere. Their "oilsealing" groove—found only in No-Leak-O—packs an oil film in between piston and cylinder walls like "packing" in a pump. Oil and gas stay where they belong. National advertising is helping the dealer sell No-Leak-O by teaching the motorist the lesson of more mileage on less oil and gas. It will pay you to stock No-Leak-O at once. Price 50c and up.

NO-LEAK-O PISTON RING CO., Dept. T-57, Baltimore, Md.



YAHOOOTA

Let your customers hear the
Sparton speak!

Special display heard given free with initial order for six. Write for complete particulars. The Sparks-Withington Co., Jackson, Michigan



Monogram Light Distributors

Standard Equipment on 30
of America's Foremost Cars

Write for Prices.

MONOGRAM LENS CORP.,
1834 Broadway, New York

Whittled
VACUUM DRIVEN
TIRE PUMP

A better, quicker, engine-operated
tire pump that sells for less. A
great dealer opportunity. Write
for details today.

VACUUM PRESSURE PRODUCTS CO., Inc.
105-115 South Calvert St. Baltimore, Md.

WEIDENHOFF PRODUCTS

Electrical Testing Equipment
Universal Test Benches, Growlers, Magnetizers, etc.

Write today for Bulletin M-18.
4358 W. Roosevelt Rd., Chicago, Ill., U. S. A.



CARTER OIL GAUGES

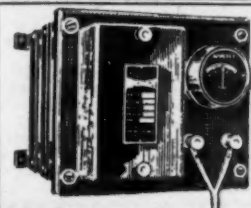
For Ford, Chevrolet and Dodge—Only \$3.75
Buick, Oakland and Chandler—\$5.00

ACCURATE—EASY TO INSTALL—GUARANTEED

Screw gauge to dash or instrument board; connect copper tube with elbow in place of lower petcock. No oil passes thru tube or gauge. No moving parts, floats or plungers. Easy to sell; easy to install. Big money-makers.

Order from your jobber or write for discounts.

Carter Motor Accessories, Inc., 388 Pearl St., Buffalo, N. Y.



Automobile and Radio batteries charged for a nickel. Ten million car owners and five million radio fans are prospects for

**THE
HOMCHARGER**

BIG PROFITS. WRITE NOW.

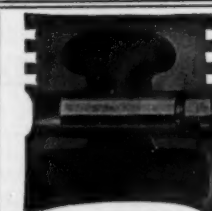
The Automatic Electrical Devices Co.
122 West 3rd St. Cincinnati, Ohio



FOLBERTH
Automatic
WINDSHIELD CLEANER

A good profit for you in this
wonderful, fast-selling necessity.
Ask your jobber or write.

THE FOLBERTH AUTO SPECIALTY CO., CLEVELAND



KEYSTONE REAMERS DO THE JOB RIGHT

Keystone Six Adjustable Pilot Piston Pin Reamer

Write for Catalogue Six A
KEYSTONE REAMER & TOOL CO.
Western Sales Division: Eastern Sales Division:
180 N. Market St., Chicago 30 Warren St., New York
Factory: Millersburg, Pa.

Harvey
RACINE
**Ride Rite
Springs**
Make Rough Roads Smooth

Harvey design and quality, and Harvey national advertising and turn-over policy make the Harvey contract profitable.

Harvey Spring & Forging Co.,
Dept. 14
Racine, Wisconsin

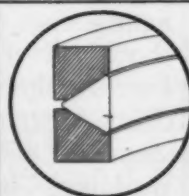
WHEN ALL advertisers demand their money's worth, all publications will provide circulation reports verified by the Audit Bureau of Circulations.

It is one of the mysteries of the advertising world that while all manufacturers demand verification of weight and quality in the material purchased, some of them still buy advertising space without knowing what they are paying for.

Such advertisers, however, are now exceptional. Most of them demand verified A. B. C. circulation statements before placing contracts.

In the case of Motor Age, the demand is immediately met.

It is a member of the Audit Bureau of Circulations.



WedgeRite
Piston Rings

WedgeRite Piston Rings are made up of three sections; two outer rings and a wedge-shaped ring of untempered spring steel. The wedge-shaped ring bears against the two outer rings and exerts a constant outward pressure—insuring permanent maximum ring efficiency. Learn the details. WedgeRite — Pittsburgh, N. Y.



The Heart of the Ford
Motor is the

ROTOR

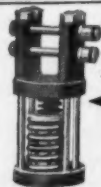
Master
PERFECT-CONTACT
ROTOR

White Brass Castings Company
1651 W. Grand Ave., Chicago, Ill.

The New

GilmerSuper-Service
FAN-BELT

Built on a new principle, the new Gilmer Super-Service Fan Belt is more flexible, lighter, and the toughest belt that ever drove a fan.

L. H. GILMER CO.
PhiladelphiaEXPOSED VIEW
NOTE DOUBLE
SPRING
CONSTRUCTIONThe **JOHNSON**
SHOCK ABSORBER

Small spring absorbs light shocks and prevents sharp recoil from heavy shocks. Large spring absorbs heavy shocks. Remarkable flexibility and smoothness of action is result. This shock absorber has been a big success for many years. Your jobber can supply you for any car.

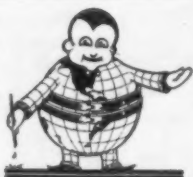
The Johnson Shock Absorber Co., 4143-45-47 W. Kinzie St., Chicago

**Free Air Service IN YOUR GARAGE \$28**

Brings trade, boosts profits, pays for itself on easy terms. Best and cheapest advertisement. Send your name on postal. Will send full information. No obligation. No salesman. Ask about 8 hour battery charging with Constant Potential, bolt and screw cases, battery charger. HOBART BROS. CO., Box AR 78, Troy, Ohio.

**A Perfect Hose Clamp****NOCO-OUT**
TRADE MARK

Efficiency for user. Profit for Jobber. Once used, always used. Attached without tools or difficulty. Made to fit any hose requirement.

R-T MFG. & SALES CO.
Green Bay WisconsinHose Clamps for
Automobiles,
Trucks, Tractors,
Air Planes, Weld-
ing Hose, etc.**The Harward Guarantee**

We will exchange, free of charge, any HARWARD Piston Ring that does not show contact with cylinder wall all the way round when the car has been driven five miles. Send for booklet, "Inside Dope."

Harward Piston Ring

Harward Mfg. Co., 3939 Magnolia Ave., St. Louis, Mo.



Air Compressors; Gasoline and Oil Storage Systems; Heavy Metal Storage Tanks; Oil Burning Systems; Furnaces and Forges; Oil Filtration Systems; Water Softening Systems.

WAYNE TANK & PUMP COMPANY,
706 Canal Street, Fort Wayne, Ind.**Wayne****THE CLEARING HOUSE
OF THE MOTOR INDUSTRY**

FOR PARTS, ACCESSORIES, TIRES, MACHINERY REBUILDING, REPAIRING, WELDING AND USED CARS. ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING

Parts and Repairs

PARTSNEW AND USED
for all makes of car**QUICK SERVICE
AND
RIGHT PRICES**WRITE—WIRE—OR COME TO
FRANKLIN SALES COMPANY
200-202-204 North First Street, East
CEDAR RAPIDS, IOWA

Parts and Repairs

GEARS & SHAFTS

New

for

**TRANSMISSION AND AXLE
SILENT TIMING GEARS
FLY-WHEEL STARTER GEARS***All Shipments Made Same Day***GUARANTEED GEAR
SERVICE COMPANY**1714 S. Michigan Ave.,
Chicago, Ill.208 Wells St.
Milwaukee, Wis.

Parts and Repairs

WE'VE GOT EVERYTHING

—In the line of New and Used Auto Parts, Accessories and Supplies, for all makes and models of cars.

Engines; Transmissions; Clutches; Axles; Wheels; Rims; Tires; Radiators; Gears; Axle Shafts; Bearings; Magnets; Starters; Generators; Coils; Batteries; etc., etc.

Ours is the largest stock of its kind in the world. You will save time and money by getting in touch with us first whenever you are in need of anything in this line.

WARSHAWSKY & COMPANY

World's Largest Car Wreckers and Replacement Parts House.

1915-31 So. State St., Chicago, Ill.
No Branches Ph. Calumet 7315 No Branches**GENUINE NEW
ADAMS
AXLE PARTS**

FOR

Allen, Anderson, Auburn, Climer, Harroun, Elgin, Elcar, Norwalk, Monitor, Pan, Piedmont, Economy-Vogue, Seneca and Sun.

HARRY P. ANDERSON CO.

5950 2nd Blvd., Detroit

**Exclusive Authorized Service of
the Adams Axle Co.**

Send for Parts Book

There is always a demand for expert rebuilding and repairing. If you are equipped to handle this class of work you should advertise in this section. For further information address Clearing House Department, MOTOR AGE, Mallery Building, Chicago.

Late model Duntley Timers for
Ford \$.75
Lee Motor Meter Lock, dozen..... 7.50
Lee Oil Gauge for Ford..... .25**E. A. BOWMAN, INC.**

41 Harper Avenue Detroit, Mich.

New
and
Used**PARTS**for
All
Cars

Save 25 to 75%

AUTO SALVAGE & PARTS CO.
Oklahoma City, Okla., U. S. A.**AUTO Save 50 — 90% 2000 Models PARTS**

NEW AND USED GEARS, AXLES, BEARINGS, SPRINGS, MAGNETOS, GENERATORS, ETC. JOBBERS IN BANKRUPT AUTO SUPPLIES.

BRIGHTMAN AUTO EXCHANGE

321 Windsor Ave. HARTFORD, CONN.

SAVE50 to 75 Per Cent
on Reclaimed
Auto PartsThe Original "We Tear 'Em Up and Sell the Pieces"
AUTO WRECKING COMPANY
1413-1415 McGee St., Kansas City, Mo.**PARTS****FOR NEARLY ANY MAKE OF CAR**
At 25 to 75% Off List PriceSatisfaction guaranteed or money refunded
I. WOLF AUTO PARTS & TIRE CO.
"A Million Parts"

619 N. Illinois St. Indianapolis, Ind.

Parts and Repairs
Rebuilding and Repairing

WICHITA AUTO WRECKING CO.
"The Old Reliable"

Offers you quick service, quality parts and absolute satisfaction—and our prices are a little lower. We are an old reliable house and all that implies. Our stock of parts is one of the largest in the country—from a 1907 one cyl. Reo to a 1921 Overland Four.

Wichita **GIVE US YOUR NEXT ORDER** Kansas

NEW PARTS FOR ALL CARS

Axle Shafts, Bearings, Gears, Universal Joints, Starting Motors, Lighting Generators, Coils, Magnets, Wheels, Rims, Springs, etc.

Dealers Write for Monthly Bulletin
PURITAN MACHINE CO.
DETROIT, MICH.

Eastern Branch: 245 West 55th St., N. Y. City

Notice to Auto Parts Dealers

Chandler ring gears and pinion gears, 53-12 spiral, fits all models 1916 to 1921. Brand new A-1 guaranteed gears.

Write for prices

Dorman Automotive Parts & Gear Co.
No. 21 E. 8th St., Cincinnati, Ohio

AUTO PARTS

Nearly 3,000,000 Auto Parts.

Why buy new parts, when we can

SAVE YOU 50% to 75% off list?

Parts for all models, Maxwell, Overland, Studebaker, from 1910 to 1920, and others.
EUREKA AUTO PARTS & TIRE COMPANY
334 N. Capitol Ave. and 503 N. Illinois St.
Indianapolis Indiana

CYLINDER GRINDING SPECIAL

Prices Effective Nov. 1, 1922

Cylinders ground and fitted with light grey iron pistons, rings and pins. Pistons accurately ground to fit cylinders.

FORD—Complete,\$14.00
POPULAR Cars—Light 6
cyl. 3½ bore or under,
complete 35.00

OTHERS IN PROPORTION

Motors Rebuilt for Racing. Aluminite
Pistons. Iron Pistons. Piston Pins and
Rings.

PARTS FOR ALL MAKE CARS
GREEN ENGINEERING CO.
Dayton, Ohio

**Are You Interested
in Regrinding
Cylinders?**

The Heald Machine Company build a machine expressly for this work. Simple, self-contained, large capacity, and sold at a moderate price.

Regrinding is ideal for small machine shops, auto repair shops and welding concerns.

Let us send you a survey of what others are doing in this business.

The Heald Machine Company
61 New Bond St.
Worcester, Mass.

Rebuilding and Repairing
Patents and Patent Attorneys
Miscellaneous

**WE MAKE A
SPECIALTY
OF**

Cylinder
Grinding

Crankshaft
Grinding

EAGLE PROCESS
Scored Cylinder
Repairing

Steel Starter
Gears Installed

Oversized Pistons,
Rings and Pins
All work guaranteed

EAGLE PROCESS COPPER SCORED CYLINDER
IN-LAY REPAIRING

We do not heat or enlarge the diameter of the bore; no soldering or welding, no melting or falling out; just a simple mechanical method of copper inlay; guaranteed the life of the motor under all sorts of conditions. For information address the

EAGLE MACHINE CO., 24 N. Noble St., Indianapolis, Ind.

Ship your work to nearest branch

Trindl Co. Chicago, Ill.
Auto Engine Co. St. Paul, Minn.
New Haven Machine Co., New Haven,
Conn.
Stafford Machine Co., Kansas City, Mo.
Gladish Machine Co., Chattanooga, Tenn.
Marine Ways Machine Co., St. Peters-
burg, Fla.
J. A. Hingley Machine Co., Denver, Colo.
J. B. Cook Auto Machine Works, Little
Rock, Ark.

Louisville Grinding Co., Louisville, Ky.
Sunderland Machine Shop, Omaha, Neb.
H & H Machine Co. St. Louis, Mo.
Youngstrom Co. Des Moines, Ia.
Tranter Mfg. Co. Pittsburgh, Pa.
Adams & Meyers Co., Fort Wayne, Ind.
Schlotz Tool Gear & Machine Works,
Waterloo, Ia.
Theuton Machine Co., Toronto, Canada
National Machine Co. Erie, Pa.

All Phones:
West 4918

LAMMERT & MANN CO.

ESTABLISHED 1894

215-21 N. Wood St.
CHICAGO

EXPERT CYLINDER AND CRANKSHAFT RE-GRINDING

**SPECIAL LIGHT WEIGHT
CAST IRON PISTONS**

**PISTONS—RINGS—WRIST PINS
SCORED CYLINDERS REPAIRED**

B-N Piston Pins for nearly every car

Quick Service on Pins.
Jobbers Everywhere.

Ask for our Specification Chart

See Motor Age,
Nov. 18

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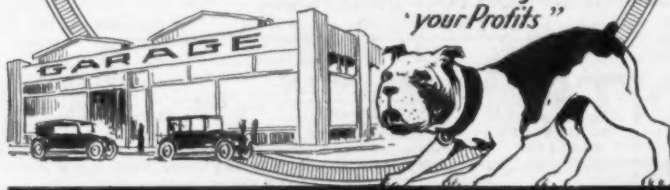
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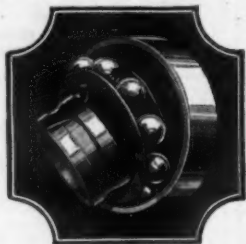
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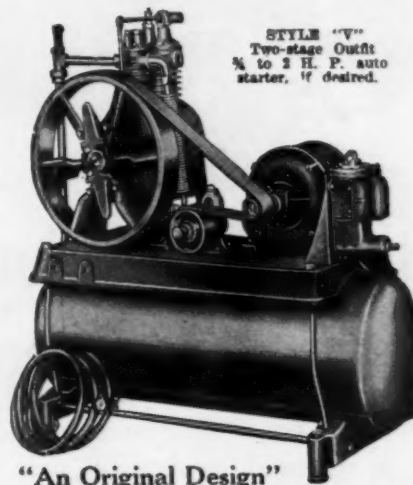
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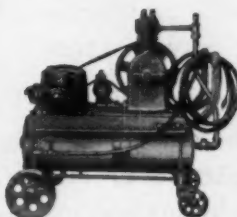
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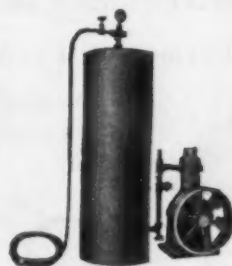


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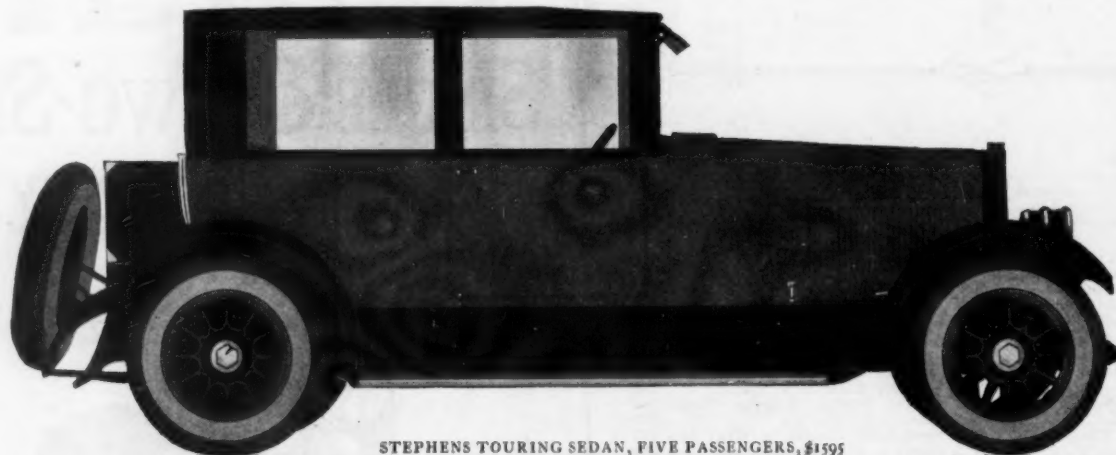
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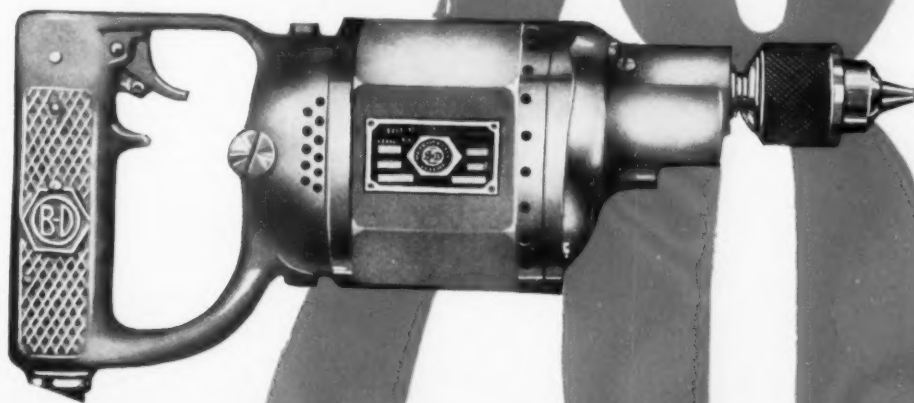
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